REPORT

OF THE

MEDICAL SERVICES, MINISTRY OF HEALTH
REPUBLIC OF THE SUDAN

FOR THE YEAR

1957/58

(G-P.P. 3177) S.G. 886 M. of H. 400 Cps. 10/59

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Chapter I

INTRODUCTION

The outstanding feature of the year was the Asiatic Influenza epidemic that swept through the country leaving no area untouched. It varied in severity from one place to the other but on the whole it was of a very low fatality rate. 389,346 cases were recorded in outpatients clinics, of these 10,241 were hospitalized with 70 recorded deaths.

Cerebro-Spinal Meningitis also appeared in an epidemic form in Bahr El Ghazal Province for the 6th year running although the figures were very much lower than previous years.

Small Pox has shown its presence in 6 out of the 9 Provinces, the highest record being in Blue Nile where the western immigrants pour in to work in cotton fields.

The seasonal incidence of measles, whooping cough and chicken pox was also encountered in various parts of the country with very low mortality.

The incidence of malaria shows a decrease in all provinces from last year.

Snail control in the Gezira irrigated area continued with a marked decrease in snail population as appears from the figures.

Kala Azar campaign in Blue Nile and Upper Nile Province was pursued and an appreciable reduction in cases was achieved.

W.H.O. Assisted Projects

Sleeping Sickness—protection with pentamidine was continued in the endemic area. 156,739 persons were injected during the year.

B.C.G. Team

Testing and vaccination in the Southern Provinces progressed very well. The activities of the team since the beginning of the campaign in December 1956 up to date produced the following figures.

Total number of people tested	*No. vaccinated*
476,604	167,950

T.B. Pilot Project—Wad Medani. The work progressed well according to plan in training, demonstration, case finding and treatment. 15,689 cases passed through the clinic during the year. 22,247 persons were tested, of whom 9,874 were vaccinated.

Malaria Pilot Project. The work went according to plan. In addition to control work, training of Public Health Staff and junior sanitarians was successfully conducted. The second phase brings a total of 453,400 population under protection. The project work still continues.

Nursing College. There are 10 girls in the school of whom 6 will sit for the examination next year. Great hopes are maintained that more applicants will come forward.

UNICEF Assistance to Mother and Child Health Centres was extended during the year in the way of milk, Vit. Tabs., sewing machines etc. to 25 centres.

Consolidation and expansion of hospitals and dispensaries and special departments continued. The staff situation is slightly easier.

Some 18 visitors from W.H.O. and various other countries visited the Sudan either in connection with the above mentioned projects or on fellowship study tours.

12 delegates from the Ministry of Health have attended the following Conferences or Seminars.

Name	Conferences	Date
Dr. Hassan Abdel Latif ...	The 12th Congress on International Dental Education in Rome.	7th to 14th Sept. 1957
Dr. Mansour Ali Hasseb ...	Congress in Abnormal Haemoglobin in Istantbul.	15th to 22nd Sept. 1957
Dr. A. A. Zaki	Sub-Committee ' A ' of WHO in Alexandria.	23rd to 27th Sept. 1957
Dr. A. A. Zaki	Health Education of the Public.	28th Oct. to 1st Nov. 1957
Dr. Khalil Abdel Rahman and Sitt Hawa Ali El Bassir	Maternity and Child Health Seminar in Cairo	25th, Nov. to 7th Dec. 1957
Dr. Abdel Gadir Hassan Ishag	Congress in Trachoma in Cairo	1st to 12th March 1958
Dr. Mohy El Din Mohadi ...	T. B. Conference in Cairo	11th to 13th Feb. 1958
Dr. A. O. Abu Shamma and Dr. M. Rashad Farid	10th Anniversary Commemorative Season of W.H.O. in Minneapolis.	26th May to 19th June 1958
Dr. Mahmoud Hussein and Dr. Abbas Hamad Nasr	Health Congress of the Royal Society of Health in U.K.	28th April to 2nd May 1958

The following candidates were awarded study courses during the year.

Name	Nature of Study	Duration of the Course	Country
Mubarak Eff. Ali Karrar ...	Drug Analyst (Chemistry) ...	36 months	U.K.
Dr. Maurice Sidra	Primary F.R.C.S.	18 ,,	,,
Dr. Mohd. El Sayed Ibrahim	Diploma Ophthalmology ...	12 ,,	,,
Dr. Adib Salib	,, ,,	12 ,,	,,
Sitt Latifa Mohd. Kheir ...	Maternity and Child Health ...	12 ,,	Jordan and Egypt.

CHAPTER II

ADMINISTRATION

(a) STAFF AND FUNCTIONS

Table I shows the establishment of classified staff. Some categories of professional and technical staff were still under establishment. The table includes officials serving on secondment with Local Government Authorities.

PERSONNEL

TABLE I

Statistics of Classified Staff Establishment covering the period 1.7.1957 *to* 30.6.1958 :—

Category	Establishment	
	Sudanese	Expatriates
HEADQUARTERS		
Director	1	—
Deputy Director	1	—
Asst. Director (Public Health)	1	—
Asst. Director (Hospitals)	1	—
Deputy A. Director (Public Health)	1	—
Deputy A. Director (Hospitals)	1	—
Chief Public Health Inspector	1	—
Senior Establishment Officer	1	—
Inspector of Administration	1	—
Establishment Officer	1	—
Principal School of Hygiene	1	—
Principal Matron	1	—
Asst. Principal Matron	1	—
Head Staff Clerk	1	—
Secretary to Minister of Health	1	—
Staff Clerk	4	—
Senior Clerk	10	—
Clerk (including Nursing College and T.B.T. Centre)	23	—
Junior Clerk (including Minister of Health Office)	8	—
FINANCE BRANCH		
Controller of Accounts	1	—
Inspector of Accounts	1	—
Head Accountant	1	—
Accountant	4	—
Senior Book-keeper	4	—
Book-keeper	19	—
Junior Book-keeper	2	—

Category	Establishment	
	Sudanese	Expatriates
Stores Section		
Controller, Medical Stores	1	—
Asst. Controller Medical Stores	1	—
Supt. of Stores	2	—
Stock Verifier	1	—
Senior Storekeeper	3	—
Storekeeper	17	—
Storekeeper Under Training (Northern Hospitals)	10	—
Junior Storekeeper	8	—
Telephone Operator	1	—
	136	—
Hospitals and Dispensaries		
Senior Physician and Director Khartoum Hospital	1	—
Senior Surgeon	1	—
Senior Obstet. and Gynaecologist	1	—
Senior Ophthalmologist	1	—
Senior Psychiatrist	1	—
Physicians (including Chest Physicians-3)	10	1
Surgeons (including E.N. and T.)	3	7
Psychiatrist	1	—
Radiologist	1	—
Anaesthetist	—	1
Gynaecologist	5	2
Ophthalmologist	6	2
General Duty Doctors (including Study Courses)	91	40
House Officers (Housemen)	32	—
Senior Dental Surgeon	1	—
Dental Surgeon	—	4
Dental Officer	4	—
Dental Mechanic	—	2
Dental Mechanic Trainee	3	—
Pharmaceutical Registrar	—	1
Pharmacist	1	—
Lay Administrator	1	—
Supt. Radiography	—	1
Clinical Pathologist	—	1
Senior Dispenser	5	—
Dispenser	22	—
Dispenser Under Training	5	—
Senior Radiographer	2	—
Radiographers	17	—
Asst. Radiographers U.T.	16	—
X-Ray Technician (T.B. Training Centre)	2	—
Hospital Manager	5	—
Dark Room Technician	1	—
Electrical Engineer	—	1
Laboratory Technician	—	3
Senior Medical Assistant	15	—
Medical Assistant	486	—
Mental Health Assistants	2	—
Ophthalmic Assistant	7	—
Refractionists	16	—
Senior Nursing Instructor	2	—
Nursing Instructor	33	—
Theatre Attendant	54	—
Head Mumarid	49	—
Senior Clerk	8	—
Clerk	30	—

Category	Establishment	
	Sudanese	Expatriates
Junior Clerk	16	—
Card Clerk (New K.H.)	1	—
Senior Book-keeper	14	—
Book-keeper	20	—
Junior Book-keeper	28	—
Senior Storekeeper	2	—
Storekeeper	15	—
Asst. Storekeeper (Ex-Ration Clerk)	43	—
Storekeeper U.T. (Southern Hospitals)	10	—
Telephone Operator	6	—
Quarantine Overseer	2	—
Southern Trainee	10	—
Nursing Staff		
Matron, Khartoum Hospital	—	1
Matron, Omdurman Hospital and N.T. School	—	1
Hospital Matrons W'Medani, Port Sudan, Fasher, Juba, Obeid and Atbara	4	2
Asst. Matron—charge sisters	7	8
Physiotherapist	—	6
S. Nursing Sister	19	—
Nursing Sister (Expatriate)	—	23
School Hostess (Nursing C.)	1	—
Nursing Sister (Sudanese)	29	—
Dietician Sister (New Khartoum Hospital)	—	1
Theatre Sister (New Khartoum Hospital)	—	1
Sister Tutor (New Khartoum Hospital)	—	2
Ward Sister (New Khartoum Hospital)	—	17
Nurse U.T. Abroad	2	—
Military Hospitals		
Miralai (Dr.) O.C.M. Corps	1	—
Kaimakam (Doctor)	1	—
Bimbashi (Doctor)	1	—
Yuzbashi (Doctor)	3	—
Sagh (Doctor)	2	—
Yuzbashi (Dispenser)	1	—
Total	1179	126
Public Health		
Province Medical Officer of Health	11	—
Asst. Province Medical Officer of Health	9	—
Woman Doctor	1	—
Senior Public Health Inspector	11	—
Public Health Inspector	12	—
Port Health Officer	1	—
Public Health Officer	43	—
Principal M.T. School	—	1
Principal H.V.T. School	1	—
Asst. H.V.T. School	1	—
Asst. M.T. School	1	—
Health Visitor	19	—
Senior Staff Midwife	6	—
Staff Midwife	16	—
Asst. Supt. Nursing Officer	2	—
Senior Health Visitor	6	—
Supt. M.T. School	6	—
Supt. Nursing Officer	8	4
Senior Sanitary Overseer	1	—

Category	Establishment	
	Sudanese	Expatriates
Sanitary Overseer	145	—
Public Health Student Under Training	4	—
Sanitary Overseer (Public Health Student Under Training)	27	—
Senior Clerk	1	—
Clerk (Including T.B. Campaign)	5	—
Junior Clerk	13	—
Junior Book-keeper	1	—
TOTAL	351	5
RESEARCH AND LABORATORIES		
(a) *Stack Medical Research*		
Asst. Director Research	1	—
Bacteriologist...	—	1
Pathologist	—	1
Registrar	1	—
Supt. Laboratory	—	1
Laboratory Technician	7	1
Laboratory Technician Trainees	11	—
Senior Laboratory Assistant	12	—
Laboratory Assistants	65	—
Head Laboratory Attendant	2	—
Junior Technical Assistant...	1	—
Senior Clerk	1	—
Clerk	1	—
Junior Clerk	1	—
(b) *Chemical Laboratories (W.C.L.).*		
Government Analyst	1	—
Asst. Government Analyst	3	—
Scientific Officer Under Training	2	—
Senior Technical Assistant	2	—
Technical Assistant	5	—
Junior Technical Assistant...	3	—
Clerk	1	—
Library Clerk	1	—
(c) *Medical Entomology*		
Medical Entomologist	—	1
Asst. Scientific Officer Under Training	1	—
Entomological Technician	1	—
Technical Assistant	1	—
Junior Technical Assistant...	2	—
Junior Clerk	1	—
(d) *Schistosomiasis*		
Biologist	—	1
Senior Technical Assistant	1	—
Technical Assistant	1	—
Clerk	1	—
Storekeeper	1	—
	131	6

Section	Establishment	
	Sudanese	Expatriates
Graphic Museum		
Technical Assistant	1	—
Museum Attendant	2	—
Total	3	—

SUMMARY OF CLASSIFIED STAFF

Section	Establishment	
	Sudanese	Expatriates
Headquarters	136	—
Hospitals and Dispensaries	1179	126
Public Health	351	5
Stack Medical Research	103	4
Chemical Analytical Section	18	—
Medical Entomology	6	1
Schistosomiasis	4	1
Graphic Museum	3	—
Grand Total	1800	137

Unclassified staff excluding casual labour numbered 7646 approximately.

PHYSICIANS ETC. PRACTISING IN THE SUDAN

Occupations	Government Officials Serving in M.H.	Private Practice
Physicians (including Chest Physicians)	12	75
Surgeons	11	—
Obstet. and Gynaecologists	8	—
Ophthalmologists	9	—
Psychiatrists	2	—
Radiologists	1	—
Anaesthetists	1	—
General Duty Doctors	131	—
Dentists	9	29
Pharmacists	2	38
Dispensers	27	—
Medical Assistants	501	—

(b) LEGISLATION

The following legislations were enacted during the year :—

(1) PROVISIONAL ORDER No. 6, 1957

THE MEDICAL COUNCIL ORDINANCE (SECOND AMENDMENT), 1957

(1957 P.O. No. 6)

In exercise of the powers conferred upon it by Article 70 of the Sudan Transitional Constitution, the Council of Ministers hereby makes the following Provisional Order :—

1. Upon being confirmed by both Houses of Parliament, this order may be cited as the Medical Council (Second Amendment) Act, 1957.

2. In Sub-Section (i) of Section 4 of the Medical Council Ordinance, 1955.

   (a) In Clause (c) the words " Registered Medical Practitioners in Practice in the Sudan " shall be omitted.

   (b) After Clause (c) the following new Clause shall be inserted :— " (d) two members elected by the registered Medical Practitioners in practice in the Sudan ; in accordance with regulations made under this Ordinance."

(2) AMENDMENT OF THE PROHIBITED AND RESTRICTED GOODS ORDINANCE, 1939

(1957 L.R.O. No. 39)

The Council of Ministers, in exercise of the powers conferred upon it by subsection (1) of Section 5 of the Prohibited and Restricted Goods Ordinance, 1939, hereby makes the following amendment in the third schedule thereto :—

In entry (c) of item 15 of Part I (Restriction upon Import) the words " such as D.D.T., B.H.C. etc ", shall be omitted ; and the words " other than Aldrin, Dieldrin, Endrin and Toxaphene " shall be substituted therefor.

(3) THE WORLD HEALTH ORGANIZATION (RATIFICATION) ACT 1959

(1957 Act No. 12)

An Act to ratify the Constitution of the World Health Organization.

BE IT HEREBY ENACTED BY PARLIAMENT AS FOLLOWS :—

1. This Act may be cited as the World Health Organization (Ratification) Act, 1957.

2. The Constitution of the World Health Organization, made in New York, 26th July, 1946 is hereby ratified and affirmed, with effect from 8th May, 1956.

(4) THE POISONS ORDINANCE 1939, AMENDMENT, 1957

(1957 L.R.O. No. 42)

The Central Board of Public Health in exercise of its powers under Section 23 of the Pharmacy and Poisons Ordinance, 1939, hereby adds the following drugs to Part 3 of the Poisons List, namely :—

drugs containing not less than 95 per cent of 1 : 2 : 3 : 4 : 10 : 10-hexachloro-I : 4 : 4a : 5 : 8 : 8a-hexahydro-I : 4 : 5 : 8-dimethanonaphthalene and not more than 5 per cent of insecticidally active related compounds.

drugs containing not less than 85 per cent of 1 : 2 : 3 : 4 : 10 : 10-hexachloro-6 : 7-epoxy-I : 4 : 4a : 5 : 6 : 7 : 8 : 8a-octahydro-I : 4 : 5 : 8-dimethanonaphthalene and not more than 15 per cent of insecticidally active related compounds.

Hexa chloro-octahydro-endo, endo, dimethanonaphthalene.
Chlorinated camphence (67-69 per cent chlorine).

any mixture of demeton 0 (diethyl S—2—ethyl thio ethyl, phosphorothionate and demeton S (diethyl S—2—ethyl thio ethyl) phosphorothionate.

Bis (dimethylamino) fluorophosphine oxide.

Azidobisideethylaminophosphine oxide.

Bis (monoisopropylamino) fluorophosphine oxide.

00—diethyl O—P—nitrophenyl—thiophosphate.

Octamethyl pyrophosphoramide.

Tetraethyl dithio pyrophosphate.

(5) THE POISONS ORDER (AMENDMENT) 1958

(1958 L.R.O. No. 4)

The Central Board of Public Health in exercise of the powers conferred upon it by Section 23 of the Pharmacy and Poisons Ordinance, 1939, hereby makes the following amendments in the Poisons List.

In Part I, the following items shall be added :—

The Kat Plant—Caths edulis.

The following substances, their salts and any preparation, admixture, extract of other substance containing any proportion of them :—

Methyl dihydromorphinone (metapon).

Alphaprodine

Amidone (also known as methadone)

Beteprodine

Hydroxypethidine (also known as bemidone)

Iso amidone (also known as isomethadone)

Ketobemidone

Methadyl Acetate

Methadol

Phenadoxone

Alphameprodine

Betameprodine

Dihydrocodeine

Acetyldihydrocodeine

Methorphinan other than dextrophan

3-Methoxy-N-Methylmorphinan other than dextro methorphan

Methyl desomorphine

3 Dimethylamino-I : I-di (2 thienyl)-I-butene

3-Ethylmethyl amino-I : I-di (2 thienyl)-I-butene

6-Pioeridino 4 : 4 diphenyl heptan-3-one

I : I-di (2-thienyl)-I-butene

Diethyl thiambutene (3) Diethylamino

1 :3 Dimethyl (4) phenyl 4 propionyloxy

hexamethyleneimine

3 Hydroxv-N phenethyl morphinan

" 4-Morpholino-2 : 2-diphenyl ethyl butyrate

4-Dimethylamino-I : 2-diphenyl-3-methyl-

2-Propinonxy butene "

In part I, the following item shall be deleted :—

(d) i N-allylnormorphine

In part II, the following items shall be added :—

Acetyl dihydrocodeinone

Colchicum, alkaloids

Curare, alkaloids

Amidopyrine sulphonate, their salts

Antihistamine substances, the following their salts : their molecular compounds :—

Antazoline

Bromazine

Chlorocyclizine
Diphenydramine
3-Di-n-butylaminomethyl-4 : 5 : 6-
trihydroxphthalide
Phenindamine
Promethazine
Substances being tetra substituted
N-derivatives of ethylenediamine or propylenediamine.
Carbachol
Chlorpromazine, its salts
Dextrorphan, its salts
Diacetyl-N-allyl nor morphine, its salts
Di-isopropyl flurorophosphonate
1 : 4 Dimethane sulphonoxy butane : its salts
Dipipanone : its salts
Dithienyl allylamine compounds their salts
Gallamine : its salts ; its quaternary compounds
Laudexium, it salts
6-Mercaptopurine, its salts
Methyl pentynol
Mustine, its salts
Nalorphine (N-allylnormorphine) its salts
Paramethadione, its salts
Phenyl acetyl urea
Phenyl butazone, its salts
Polymethylene bistrimethylammonium salts
Sodium monofluoracetate
Tri-(2-chloroethyl) amine : its salts
Triethanomelamin : its salts
Troxidone

To the item beginning " Amino alcohols " add the words " their salts "

To the item beginning " Mercury " add the words " organic compounds of mercury which contain a methyl (CH3) group directly linked to the mercury atom.

In Part II, the following items shall be deleted :—

Colchicine
Curarine
Dinitrocresols

In Part 3 the following items shall be added :—

Dinitrocresols (DNC), their compounds with a metal or base

Dinosam, its compounds with a metal or base

Dinoseb, its compounds with a metal or base

Sodium Nitrite

Zinc Phosphide

After the words " organic compounds of mercury " add the words " except compounds which contain a methyl (CH3) group directly linked to the mercury atom."

(c) FINANCE

Table II (A)

Income and Expenditure of Ministry of Health over the last 4 years

Item	1954/55	1955/56	1956/57	1957/58
	LS.	LS.	LS.	LS.
Revenue...	50,047	44,808	50,354	63,529
Expenditure :				
Personnel and Personal Allowances	1,537,750	1,464,612	1,677,283	1,859,818
Services	1,359,724	1,169,724	1,337,020	1,476,329
Extraordinary	26,095	28,000	7,956	11,993
Total	2,923,569	2,662,336	3,022,259	3,348,140

Table II (B)

Analysis of the Expenditure of the Ministry of Health in 1957/58 *from* 1.7.57 *to* 30.6.58

Sections	Personnel	Services	Extra-ordinary	Total
	LS.	LS.	LS.	LS.
(a) Headquarters	96,980	296,854	11,993	405,827
(b) Hospitals	1,489,712	964,946	—	2,454,658
(c) Hygiene and Public Health ...	205,332	204,339	—	409,671
(d) Research	66,374	10,190	—	76,564
(e) Graphic Museum	1,420	—	—	1,420
(f) Seconded Staff	—	—	—	—
Total	1,859,818	1,476,329	11,993	3,348,140

Remarks :—1957/58—(1) Figures are based on actual expenditure to 31.5.1958 plus (2) estimated expenditure up to June 1958.
1956/57 Figures exclude June 1957, supplementary account.

CHAPTER III

PUBLIC HEALTH

(a) HEALTH OF OFFICIALS

TABLE III

NATIONALITY	Number of officials employed	TOTAL		Average days sickness		Died	Invalided
		Number placed on sick list	No. of days sick	For all officials	For those who were sick		
British	199	9	60	.30	6.66	—	—
Sudanese	13,120	2,652	20,930	1.60	7.85	2	1
Others	416	39	269	.64	6.90	—	—

(b) GENERAL HEALTH

Work done in Hospitals and Dispensaries

Expansion and consolidation continued during the year.

Clinics established were as follows :—

1 Dental Clinic at El Fasher.

1 Eye Clinic at Kassala.

1 X-Ray Department at Gedaref.

Kurmuk Hospital was opened during the year. The other three hospitals *i.e.* Raga, Rigl-El-Fula and Bentui which were mentioned in last year's report were not opened. The bed accommodation in these three hospitals is 220.

The following additional hospitals have been approved and are under construction :

Tonj

Um Ruaba

Dalgo

Renk

These will add 240 beds more to the total beds.

Medical Services buildings completed during the year include :

Province	Locality	Buildings Erected
Blue Nile	Singa	Junior Standard Quarter for Asst. Radiographer.
	Medani	Post Mortem Room
	,,	Standard Theatre
	,,	24-bedded Eye Ward
	,,	Class II Quarter for Health Visitor
Darfur	El Fasher	Offices for Physician and Surgeon
	,,	Nurses Hostel
	,,	Midwives Training School
	Geneina	Public Health Offices
Equatoria	Juba	Improvements to Midwives Training School
Kassala	Kassala	Eye Clinic
	,,	20-bedded Eye Ward for Males
	,,	Nurses Hostel
	Gedaref	Maternity Block
	,,	X-Ray Dept.
Khartoum ...	Khartoum	Additions to School of Hygiene
	,,	,, ,, Medical Stores
	Omdurman	Dental Clinic
Kordofan	El Obeid	Extension to Midwives Training School
	Nahud	Class II House for Health Visitor
Northern	El Damer	Health Centre
Upper Nile... ...	Malakal	24—bedded T.B. Ward for Males
	,,	24—bedded T.B. Ward for Females
	,,	Store for Equipment and Instruments

The programme of expansion of dispensary services was maintained. Additions include :—

Province	New Dispensaries	New Dressing Stations
Bahr El Ghazal	—	2
Blue Nile	2	17
Darfur	3	—
Equatoria	1	—
Kassala	4	2
Khartoum	1	6
Kordofan	—	5
Northern	5	5
Upper Nile...	2	—
	18	37

Table IV

Work done in Hospitals and Dispensaries for 10 Years

Year	Admissions	Attendances	Operations
1948	140,511	9,820,304	17,573
1949	151,011	10,186,668	21,327
1950/51 (18 months)	302,526	16,503,371	31,459
1951/52	168,251	12,181,931	26,021
1952/53	164,331	13,966,390	26,114
1953/54	172,675	14,483,366	34,432
1954/55	171,092	16,453,892	38,285
1955/56	154,093	17,694,550	38,287
1956/57	176,716	20,430,070	53,839
1957/58	175,543	21,410,339	50,023

There were 75 licensed private practitioners working independently during the year under review whose statistics are not included above.

(c) VITAL STATISTICS

Below is the estimated population of the Sudan by Provinces according to projections made in the Department of Statistics for mid 1957 and mid 1958.

Table V

Approximate Estimation of Population by Provinces

Province	Men	Women	Children	Totals
Bahr El Ghazal	315,000	319,000	476,000	1,110,000
Blue Nile	599,000	602,000	1,015,000	2,216,000
Darfur	369,000	457,000	586,000	1,412,000
Equatoria	272,000	304,000	384,000	960,000
Kassala	311,000	278,000	410,000	999,000
Khartoum	168,000	141,000	229,000	538,000
Kordofan	534,000	569,000	801,000	1,904,000
Northern	214,000	275,000	446,000	935,000
Upper Nile	284,000	277,000	402,000	963,000
Total	3,066,000	3,222,000	4,749,000	11,037,000

Table VI

The Population of Towns of Khartoum, Khartoum North and Omdurman as Revealed by Census

Town	Men	Women	Children	Totals
Khartoum	36,717	23,801	32,585	93,103
Khartoum North and Rural Areas	84,520	75,761	137,988	298,269
Omdurman	36,343	34,039	43,169	113,551

Table VII

Crude Birth Rate: Khartoum, Khartoum North and Omdurman

Town	No. of Registered Births	Crude Birth Rate
Khartoum	3,456	37.1
Khartoum North and Rural Areas	5,832	18.1
Omdurman	4,334	38.1

These figures are calculated from births attended by trained midwives who usually register these cases but, by no means, must these be taken as accurate representation of the real picture. Registration of births and deaths are nowhere complete.

(d) PREVENTIVE MEDICINE

1. Insect Borne Diseases

(i) **Malaria.** This disease constitutes a major Public Health Proplem. The yearly figures fluctuate according to rainfall. Adult mosquitoe control with Gammexane spraying is gradually being expanded in all provinces, larval control is being effected in big towns with gardens and Agricultural Schemes.

MALARIA INCIDENCE 1957/58

Year	Bahr El Ghazal			Blue Nile			Darfur			Equatoria			Kassala			Khartoum			Kordofan			Northern			Upper Nile		
	Cases	D	Mean Rainfall m m	Cases *	D *	Mean Rainfall m* m	Cases	D	Mean Rainfall m m	Cases	D	Mean Rainfall m m	Cases	D	Mean Rainfall m m	Cases	D	Mean Rainfall m m	Cases	D	Mean Rainfall m m	Cases	D	Mean Rainfall m m	Cases	D	Mean Rainfall m m
1953/54 ...	5,873	21	869	83,720	53	487	24,025	20	541	54,567	103	1,220	41,846	26	341	15,116	3	200	76,685	43	565	16,706	2	93	17,692	23	891
1954/55 ...	12,952	33	1,023	105,589	38	481	45,927	18	614	56,617	135	1,115	44,586	29	156	16,001	10	247	113,105	61	604	16,017	—	50	28,492	13	898
1955/56 ...	10,945	19	1,013	85,771	59	407	26,607	24	510	37,203	93	1,320	33,933	23	257	15,513	2	174	100,504	36	456	13,651	4	15	28,667	1	865
1956/57 ...	15,890	78	1,167	116,925	48	538	59,134	5	716	47,737	137	1,546	57,510	29	304	19,296	3	264	140,698	55	683	16,115	9	70	26,645	29	979
1957/58 ...	14,762	34	877	79,017	69	426	31,689	8	513	50,782	99	1,238	43,542	23	293	13,701	8	235	91,048	49	528	20,422	5	54	24,993	26	793

* Figures include Gezira Irrigated Area.

Separate figures are reproduced hereunder for the Gezira Irrigated Area which shows effect of spraying where accessability of villages for periodical spraying is available.

Year	No. of Cases Diagosed as Malaria	Recorded Rainfall
1952/53	4,351	414.4 mm
1954/55	4,781	393 mm
1955/56	1,614	271.6 mm
1956/57	1,133	442.0 mm
1957/58	1,054	271.9 mm

The number of rooms sprayed in Gezira Irrigated Area was 284,646
The number of rooms sprayed in Managil Area was 27,713
The number of villages sprayed including Managil Area was 1,211
The total amount of Gammaxane or D.D.T. for spraying—LB 207,143
The total population of Gezira Irrigated Area (including Managil) 645,280

SPRAYING ACTIVITY IN THE WHOLE COUNTRY

Province	Provisional Census Population	No. of Population Protected	No. of Rooms etc. Sprayed
Bahr El Ghazal	1,110,000	107,936	24,484
Blue Nile	2,216,000	1,406,742	1,119,281
Darfur	1,412,000	22,000	67,058
Equatoria	960,000	75,393	29,631
Kassala	999,000	112,012	37,457
Khartoum	538,000	319,221	81,742
Kordofan	1,904,000	338,108	140,813
Northern	935,000	782,668	557,120
Upper Nile	963,000	114,103	27,269
Total	11,037,000	3,278,183	2,084,855

Table VIII

Species of Parasite in 7009 positive slides

Province	*P. Falciparum*	*P. Vivaz*	*P. Malaria*
Bahr El Ghazal	430	35	—
Blue Nile	980	97	—
Darfur	416	25	—
Equatoria	2383	93	121
Kassala	537	81	—
Khartoum	143	22	—
Kordofan	839	105	23
Northern	255	16	—
Upper Nile	242	62	104
Total	6225	536	248

(ii) *Blackwater Fever.* No case was reported this year, last year 22 cases were recorded.

Table IX

(iii) *Relapsing Fever, Cases and Deaths over* 10 *Years*

Year	Cases	Deaths
1948	287	8
1949	376	3
1950/51	36	2
1951/52	12	0
1952/53	97	14
1953/54	91	8
1954/55	3	1
1955/56	1	—
1956/57	4	—
1957/58	—	—

Delousing with D.D.T. powder is in force for all immigrants from the west at frontier posts where the disease used to be imported in the past.

(iv) *Leishmaniasis.* Cases recorded this year were 3939 as compared with 7463 cases in last year *i.e.* nearly half the number of incidence.

This was the result of the special campaigns mobilised in Upper Nile and Blue Nile to check the disease. More investigations were also carried out in the hope of finding any reservoir in animals and trying to specify the type of sandfly responsible as a vector.

In Kassala the figures are also on the increase and as this area is adjacent to Blue Nile, it is not yet confirmed whether this is a flur up of the local focus or due to imported labour.

The campaigns are still continuing and more research is planned to try and up-root this disease.

Table X shows the cases for the last 10 years.

TABLE X

Leishmaniasis : Recorded Incidence in 10 *Years*

YEAR	No. of Cases	
1948	460	
1949	523	
1950/51	638	(18 months period)
1951/52	1,063	
1952/53	613	
1953/54	895	
1954/55	1,106	
1955/56	1,889	
1956/57	7,463	
1957/58	3,939	

TABLE XI

Leishmaniasis, 1957/58 Distribution by Provinces

PROVINCE	Cases	Deaths
Bahr El Ghazal	20	1
Blue Nile	2,432	89
Darfur	—	—
Equatoria	94	3
Kassala	630	48
Khartoum	19	1
Kordofan	20	—
Northern	—	—
Upper Nile Province	724	20
TOTAL	3,939	162

(v) *Trypanosomiasis.* New cases detected were 159, all were admitted to hospital. No deaths occurred. Total detected cases in 1956/57 were 969.

Prophylaxis campaign with pentamidine against this disease had reduced tremendously the sleeping sickness incidence in Li Rangu, Nzara and Yambio areas of Equatoria Province.

Table XII shows the distribution of cases for 10 years.

Table XII

Trypanosomiasis : Distribution of Cases in Equatoria in 10 Years

Years	Yubu	Yambio	Yei	Koj-Kaj	Meridi	Imported	Other Localities
1948 ...	32	23	20	—	—	—	—
1949 ...	5	12	17	—	—	—	—
1950/51 ...	15	33	12	—	—	—	—
1951/52 ...	—	93	3	—	26	—	—
1952/53 ...	—	53	18	—	—	2	—
1953/54 ...	12	148	44	—	—	—	—
1954/55 ...	—	467	92	—	1	1	—
1955/56 ...	2	210	98	—	—	—	—
1956/57 ...	18	871	74	2	4	—	—
1957/58 ...	34	37	88	—	—	—	—

(vi) *Filariasis*

1094 cases were microscopically diagnosed during the year.

1040 cases of this total came from Bahr El Ghazal, Equatoria and Upper Nile Provinces of the Southern Sudan.

2. EPIDEMIC AND ENDEMIC DISEASES

(i) *Anthrax.* 19 cases with 1 death were reported.

(ii) *Cerebro-spinal Meningitis.* This year the disease appeared in all provinces of the Sudan occurring in most places sporadically but has reached epidemic proportion in Bahr El Ghazal Province. This is the 6th year that the disease has been occurring on fairly large scale in Bahr El Ghazal Province.

Table XIII

Cerebro-spinal Meningitis. Recorded Incidence and Fatality 1957/58

Province	Cases	Deaths	Fatality Rate
Blue Nile	121	16	13.2
Darfur	15	10	66.6
Kassala	19	—	—
Khartoum	22	8	36.3
Kordofan	77	18	23.4
Northern	7	2	28.6
Total Northern Provinces ...	261	54	20.7
Bahr El Ghazal	1,236	97	7.8
Equatoria	153	13	8.5
Upper Nile	358	14	3.9
Total Southern Provinces ...	1,747	124	7.7
Overall Total	2,008	178	8.8

Table XIV

Cerebro spinal Meningitis : Recorded Incidence and Fatality over 10 *Years*

Year	Recorded Cases	Recorded Deaths	Fatality Rate
1948	170	59	34.7
1949	353	102	28.9
1950/51 (18 months)	57,575	7,710	13.4
1951/52	14,527	2,031	14.0
1952 53	2,938	644	21.9
1953/54	8,942	827	9.2
1954/55	3,470	492	14.2
1955 56	9,028	828	9.2
1956/57	5,888	578	9.9
1957/58	2,008	178	8.8

Table XV

(iii) *Diphtheria : Recorded Incidence and Fatality* 1957/58.

Province	Recorded Cases	Recorded Deaths	Fatality Rate
Bahr El Ghazal	1	1	100.0
Blue Nile	115	15	13.0
Darfur	12	2	16.7
Equatoria	4	—	—
Kassala	74	5	6.8
Khartoum	217	3	1.4
Kordofan	31	2	6.5
Northern	41	9	21.9
Upper Nile	11	1	9.1
Total	506	38	7.5

Table XVI

Diphtheria : Recorded Incidences and Deaths in 10 *Years*

Year	Cases	Deaths
1948	326	27
1949	264	36
1950/51 (18 months)	573	77
1951/52	280	30
1952/53	717	37
1953/54	335	27
1954/55	369	61
1955/56	356	38
1956/57	1,497	52
1957/58	506	38

(iv) *Dysentery.* 3819 cases were treated in hospitals and 124,9^2 as out-patient cases.

(v) *Enteric Fever* : 361 cases were recorded of which 337 cases were admitted to hosptial.

Table XVII

Enteric Fever : Distribution 1957/58

Province	Cases	Deaths
Bahr El Ghazal	3	1
Blue Nile	141	19
Darfur	2	—
Equatoria	7	—
Kassala	29	1
Khartoum	41	6
Kordofan	2	—
Northern	86	2
Upper Nile...	50	3
Total	361	32

Table XVIII

Enteric Fever : Incidence over 10 *Years*

Year	Recorded Cases
1948	202
1949	311
1950/51 (18 months)	560
1951/52	578
1952/53	598
1953/54	560
1954/55	548
1955/56	449
1956/57	410
1957/58	361

(vi) *Gastro-enteritis of Children.* Records of hospitals and dispensaries registered 1(4,981 cases of which 2,726 required hospitalization, with 251 deaths, a fatality rate of 9.2 per cent.

(vii) *Leprosy.* The total number of inmates in the country was 2750.

During the year 1,360 cases were diagnosed, of which 576 came from Equatoria Province endemic zone, and 382 came from Bahr El Ghazal.

Ambulatory treatment with sulphone was continued.

(viii) *Poliomyelitis.* 86 cases were recorded this year. 71 received hospital treatment with no death recorded.

Table XX

Tuberculosis 1957/58 : *Hospital Admissions by Provinces*

Province	Pulmonary	Non-Pulmonary	Total
Bahr El Ghazal	253	29	282
Blue Nile	844	235	1,079
Darfur	137	48	185
Equatoria	240	48	288
Kassala	543	154	697
Khartoum	922	153	1,075
Kordofan	340	127	467
Northern	300	102	402
Upper Nile	170	165	335
	3,749	1,061	4,810

Table XXI

Tuberculosis. 1957/58 : *Distribution of all cases diagnosed*

Province	Pulmonary	Non-Pulmonary	Total
Bahr El Ghazal	573	106	679
Blue Nile	1,156	511	1,667
Darfur	154	90	244
Equatoria	258	47	305
Kassala	1,078	1,122	2,200
Khartoum	2,646	1,250	3,896
Kordofan	393	220	613
Northern	625	174	799
Upper Nile	612	1,059	1,671
Total	7,495	4,579	12,074

3. HELMENTHIC DISEASES

(i) *Ankylostomiasis.* 8,807 cases were recorded, of these 8,086 cases were in the two Southern Provinces *i.e.* Bahr El Ghazal and Equatoria.

(ii) *Dracontiasis.* 6,176 cases were treated.

(iii) *Bilharzia.* The snail control in Gezira Scheme continued with the same vigilance on the same lines *i.e.* mechanical trapping, chemical traps, inspection of canal in search of snails. At the same time curative teams are dealing with discovered cases. The number of snails caught was 3,464 as against 4,000 the year before. It was discovered that fishermen were a means of bringing snails in their nets from the untreated to the treated area.

A prevalance survey in the new Managil extension revealed an infection of 6.2 per cent. Control measures and treatment of cases are in force in this new area of development.

BILHARZIA IN GEZIRA IRRIGATED AREA

	HAEMATOBIUM						MANSONI					
	Children			Adults			Children			Adults		
Year	No.	Inf.	%	No.	Inf	%	No.	Inf.	%	No.	Inf.	%
1955/56	15,153	665	4.4	28,697	819	2.8	15,153	1,255	8.3	28,697	1,942	6.7
1956/57	45,662	1,188	2.5	61,762	1136	1.8	45,662	1,620	3.5	61,762	2,907	4.7
1957/58	36,133	1,057	2.9	56,961	961	1.5	36,133	1,859	5.1	56,961	3,873	6.8

Distribution of Bilharzia cases recorded in the whole country was as follows :-

Province	Cases	Deaths
Bahr El Ghazal	447	—
Blue Nile	12,862	15
Darfur	5.308	—
Equatoria	3,960	4
Kassala	159	—
Khartoum	3,061	—
Kordofan	12,096	—
Northern	3,673	2
Upper Nile	79	—
Total	41,645	21

Incidence for the last 10 years is as follows :—

Year	Cases
1948	16,724
1949	20,637
1950/51 (18 months)	58,809
1951/52	29,987
1952/53	29,286
1953/54	30,725
1954/55	37,570
1955/56	31,741
1956/57	43,863
1957/58	41,645

(e) SANITARY CIRCUMSTANCES

Water Supplies. Piped water supply was established in Shendi. More deep wells were sunk in Gezira for villagers use. The programme of digging artificial pools (Haffirs) and dams to provide water for rural areas continues. All these are protected to prevent contact and avoid polution.

Refuse Disposal. This is being carried out on orthodox methods of daily collection, burning and dumping mainly in towns.

Sewage Disposal. In rural areas few villagers make use of pit latrines, in towns the bucket disposal system is being followed. Aqua privy and septic tanks are more and more being introduced in bigger towns. The water carriage system in Khartoum is still not completed.

Housing and Town Planning. The Central Town Planning Board is the organ controlling all building developments and planning in Sudan. All matters related to housing and expansion and lay-out must be passed by this Board.

CHAPTER IV

SOCIAL HYGIENE

Midwifery. Table XXII shows the midwifery training schools working at the end of the year, date of foundation of each school, total number of midwives trained in the school since opening and the number under training in 1957/58.

Table XXII

School	Date of opening	Total midwives trained since opening	Total under training in 1957/58
Omdurman	1920	853	22
El Obeid	1948	68	12
Juba	1950	22	4
Malakal	1952	21	4
Medani	1953	55	12
Atbara	1955	26	10
Kassala	1957	—	4
El Fasher	1958	—	4
Total		1045	72

Table XXIII

Distribution of licensed midwives trained in the Sudan 1957/58.

Province	District Midwives	Certificated Nurse Midwives	Uncertificated Nurse Midwives	Health Visitors	Total
Bahr El Ghazal	—	6	2	—	8
Blue Nile	156	7	9	7	180
Darfur	34	2	2	2	40
Equatoria	5	1	16	—	22
Kassala North	15	2	1	2	20
Kassala South	14	2	—	1	17
Khartoum	119	11	1	8	140
Kordofan	94	2	3	2	101
Northern	134	6	4	2	146
Upper Nile	22	—	1	1	25
	593	39	39	25	699

New Midwifery Certificates issued during the year :—

Province	Certificated Nurse Midwives	Nuns	Village Midwives	Total
Blue Nile	2	—	13	15
Darfur	2	—	1	3
Equatoria	—	—	4	4
Kassala (S)	2	—	2	4
Kassala (N)	1	—	2	3
Khartoum	15	1	5	21
Kordofan	2	—	12	14
Northern	3	—	10	13
Upper Nile	—	2	4	6
Total	27	3	53	83

Refresher courses were given to midwives of the following Provinces :—

Province	No. of Midwives
Blue Nile	6
Darfur	2
Northern	7
Total	15

Cases attended by student midwives were as follows :—

School	Normal Delivery	Still Births and Abortion	Transferred to Hospital	By Doctors	Total
Omdurman	921	15	78	—	1,014
El Obeid	240	16	10	6	272
Atbara	269	6	25	—	300
Wad Medani	280	7	—	15	302
Kassala	60	—	—	8	68
Total ...	1,770	44	113	29	1,956

Maternal and Child Health. Improvement and expansion in this important service continued. 9 Health Centres were opened and training of staff maintained.

UNICEF is assisting in this service by provision of necessary equipment and books for training and supply of milk and vitamins for use in the centres.

25 centres were assisted in this manner during the year.

List below shows localities where proper Health Centres were operating.

HEALTH CENTRES

Khartoum	6
Omdurman	5
Khartoum North	4
Dueim	1
Kosti	1
Singa	1
Hassaheisa	1
Medani	2
Hosh	1
El Fasher	1
Geneina	1
Juba	1
Kassala	1
Port Sudan	4
El Obeid	1
Atbara	1
Malakal	1
Nahud	1
	34

Ante-Natal Clinics were operating in the following places where no health centres were established :—

Wau	Um Ruaba
Kwojok (Mission)	Kadugli
Sennar	Talodi
Roseires	Abu Zabad
Bakht Er Ruda	Moglad
Nyala	Abri (Mission)
Lui	Heiban (Mission)
Mundri (Mission)	Dakhla
Amadi	Berber
Torit	Police Camp (Medani)
Khatmia	Merowe
Gharb El Gash	Wadi Halfa
Sawagi	Debeira
Gedaref	Hillat Gallaba
Deim El Arab	Fangak
Tuti Island	Tonga
Tendelti	

Activities of Health Centres and Ante-Natal Clinics throughout the Sudan for the year 1957/58

Province	No. of Clinics	Attendance at Ante-Natal Clinics	No. of Home Visits	No. of Health Centres	Attendance at Child Health Centres	Delivery by Trained Midwives
Bahr El Ghazal ...	1	2,500	—	—	—	—
Blue Nile	10	26,023	3,959	7	19,431	4,364
Darfur	2	3,892	1,295	2	6,429	191
Equatoria	5	1,750	—	1	1,777	—
Port Sudan . ..	6	9,299	400	4	6,000	868
Kassala	6	8,076	195	1	6,156	730
Khartoum	16	76,668	5,039	15	38,467	13,622
Northern	9	9,380	576	1	9,444	56
Kordofan	11	7,820	586	2	2,377	1,170
Upper Nile	1	3,754	754	1	3,220	—
Total ...	67	149,162	12,784	34	93,301	21,001

MEDICAL EXAMINATION OF SCHOOL CHILDREN

School Medical Service. The number of pupils medically examined was :—

Bahr El Ghazal	3,832
Blue Nile	41,410
Darfur	10,623
Equatoria	1,025
Kassala	11,000
Port Sudan	7,956
Khartoum	12,368
Kordofan	5,839
Northern	37,812
Upper Nile	2,398
TOTAL	134,263

Result of Examinations of School Children for Different Diseases

PROVINCE	No. Examined	Trachoma	Bilharzia	Spleen	Pulm. T.B.	Ankylostoma	Dental Caries	All Other Diseases
Bahr El Ghazal	3,832	160	66	372	1	295	—	3
Blue Nile ...	22,222	2,093	1,030	870	—	3	375	135
Gezira Irrigated Area ...	19,188	1,829	847	533	—	5	—	—
Darfur	10,623	1,257	1,018	1,321	—	17	18	871
Equatoria ...	1,025	43	63	162	—	64	—	—
Kassala ...	11,000	1,356	26	254	—	—	—	—
Port Sudan ...	7,956	334	3	—	—	—	—	—
Khartoum ...	12,368	1,113	—	12	—	—	—	—
Kordofan ...	5,839	736	1,257	1,099	—	1	—	104
Northern ...	37,812	10,773	1,507	1,784	—	46	4,698	—
Upper Nile ...	2,398	280	4	66	4	27	—	—
TOTAL ...	134,263	19,974	5,821	6,473	5	458	5,091	1,113
PERCENTAGE		14.9	4.9	4.8	—	0.3	3.8	0.8

Mental Health

The total number of cases seen during the year by the Psychiatrist at the Clinic for Nervous Disorders amounted to 11,073 of which 1,643 were new cases and the balance of 9,430 represented the return attendances.

The number of inmates in confinement at Kober Institution is 113 (103 males and 10 females).

The Mental Diseases Board saw 10 classified as follows :—

7 cases were found fit to carry on their duties on temporary basis or referred for treatment and to appear before the Board after a certain time.

2 cases were found unfit for government service

1 case appeared before the board to decide his fitness for managing his affairs or otherwise.

Health Education

The weekly radio talks, talks and exhibition of posters during tribal gathering and press articles remained to be the media for Health Education.

Some improvement has been achieved by starting a small audo visual aid unit in Khartoum where films and film strips are shown to groups of pupils, police and other interested public.

CHAPTER V

PORT HEALTH QUARANTINE

Port Sudan port was declared infected with small-pox on 2.7.1957 as a result of a local outbreak. The infection it was believed was imported.

A total of 71 cases with 16 deaths was recorded.

The port was declared free on 30.8.1957.

Disinfection of aircraft and quarantine control of air travellers was undertaken at Wadi Halfa, Port Sudan, Khartoum, Juba, Malakal, Geneina, El Fasher, El Obeid and Kassala Airports.

The Aedic index was calculated on an inspection of all habitations within the area concerned. Table XXIV shows the aedic index throughout the year at certain airports on international routes.

TABLE XXIV

MONTH	Fasher	Juba	Kassala	Port Sudan	Khar-toum	El Obeid	Wadi Halfa	Malakal
July	0	0.2	0	0	0	0	0	0
August ...	0.1	0	0	0	0	0.01	0	0
September ...	0	0	0	0	0	0.02	0	0
October ...	0	0	0	0	0	0	0	0
November ...	0	0	0	0	0	0	0	0
December ...	0	0	0	0	0	0	0	0
January ...	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0
May	0	0	0	0.15	0	0	0	0
June	0	0	0	0	0	0	0	0

Port Sudan Quarantine. 1,169 ships entered Port Sudan harbour. The number of Sambuks entering Flamingo Bay was 308. Radio pratique was granted to 735 ships.

Suakin Quarantine. The number of pilgrims who have left Suakin for Jeddah in the past 10 years has been :— .

1948/49	11,105
1949/50	5,091
1950/51	4,666
1951/52	6,491
1952/53	13,051
1953/54	13,950
1954/55	13,921
1956	11,427
1957	23,811
1958	29,618

3,250 pilgrims left Port Sudan for the Hedjaz by air in 1958.

All outgoing pilgrims were immunised against cholera, small-pox, yellow fever and typhoid.

This year almost all pilgrims had to be quarantined for 14 days on their return owing to the occurance of small-pox.

Wadi Halfa Quarantine. Examination of labourers coming from Egypt continued. 604 river vessels were inspected. 8,378 vaccinations done.

Geneina Quarantine. 37,837 persons passed through this quarantine. 27,007 vaccinations done.

Medical Mission to the Hedjaz. The mission consisted of two doctors and 19 other staff. Treatment centres were established at Jeddah, Mecca, Muna and Medina. Medical care was afforded to many nationalities, including pilgrims and local population. 13,366 outpatient cases were treated. 51 persons were given in-patient treatment.

CHAPTER VI

EXISTING HOSPITALS AND DISPENSARIES

Number of existing hospitals, dispensaries and dressing stations and beds available

TABLE XXV

PROVINCE	HOSPITAL (50)	Beds in Hospitals				No. of Disps. and Dressing Stations	Beds in Dispensaries	Total Beds	Population	Beds per 1,000 Population
		General	T.B.	Children	Maternity					
Bahr El Ghazal	Wau	199	32	8	9	45	192	609	1,110,000	0.55
	Rumbek ...	129	—	—	—					
	Aweil	40	—	—	—					
		368	32	8	9					
Blue Nile ...	Medani ...	328	120	45	8	205	45	1,584	2,216,000	0.70
	A'Usher ...	166	40	10	10					
	Kosti	148	—	—	4					
	Dueim ...	114	—	—	—					
	Sennar... ...	156	—	8	—					
	Singa	126	24	—	—					
	Roseires ...	102	—	—	—					
	Rufaa	100	—	—	—					
	Kurmuk ...	30	—	—	—					
		1,270	184	63	22					
Darfur	El Fasher ...	178	8	10	6	67	344	821	1,412,000	0.58
	Geneina ...	96	—	4	—					
	Nyala ...	88	—	4	8					
	Zalingei ...	75	—	—	—					
		437	8	18	14					

Province	Hospital (50)	Beds in Hospitals				No. of Disps. and Dressing Stations	Beds in Dispensaries	Total Beds	Population	Beds per 1,000 Population
		General	T.B.	Children	Maternity					
Equatoria ...	Juba	222	64	45	14	102	364	1,367	960,000	1.42
	Meridi ...	102	5	4	5					
	Yei	83	—	—	—					
	Kapoeta ...	88	—	—	—					
	Torit	114		—						
	S. Yubu ...	121	—	—	—					
	Li Rangu ...	117	12	2	5					
		847	81	51	24					
Kassala ...	Kassala ...	262	20	10	16	87	178	1,184	999,000	1.27
	Gedaref ...	179	20	12	3					
	Aroma ...	100	—	6	—					
	Port Sudan ...	219	68	20	14					
	Tokar ...	57	—	—	—					
		817	108	48	33					
Khartoum ...	Khartoum ...	565	—	71	42	59	41	1,507	538,000	2.80
	Omdurman ...	224	—	56	—					
	Khartoum N.	88	—	10	12					
	R. Hospital ...	7	100	—	—					
	Abu Anga ...	—	93	—	—					
	Eye Hospital	118	—	—	—					
	Abu Deleig ...	40	—	—	—					
	Omd. Maternity	—	—	—	40					
		1,042	193	137	94					

Province	Hospital (50)	Beds in Hospitals				No. of Disps. and Dressing Stations	Beds in Dispensaries	Total Beds	Population	Beds per 1,000 Population
		General	T.B.	Children	Maternity					
Kordofan ...	El Obeid ...	245	48	62	45	89	611	1,505	1,904,000	0.79
	Kadugli ...	117	8	—	3					
	Dilling ...	78	—	—	8					
	Abu-Gebeiha ...	80	—	12	8					
	Talodi ...	60	—	—	—					
	Nahud ...	109	—	9	2					
		689	56	83	66					
Northern ...	Atbara ...	238	36	15	—	138	90	936	935,000	1.00
	Halfa	120	46	22	14					
	Dongola ...	78	12	—	8					
	Merowe ...	80	7	8	—					
	Berber ...	82	—	10	8					
	Shendi ...	60	—	8	4					
		658	101	63	34					
Upper Nile ...	Malakal ...	254	28	30	8	50	229	649	963,000	0.67
	Bor	76	—	16	8					
		330	28	46	16					
Grand Total ...		6,323	791	517	602	842	2,094	10,172	11,037,000	0.92

The ratio for hospital beds only is .73 per 1000 population.

CHAPTER VII

MEDICAL MISSIONS

The following table shows the work carried out by the Medical Missions :—

Medical Mission	In-patients	Out-patient Attendance	Operations	No. of Beds
Church Missionary Society				
Omdurman (Khartoum Province) ...	1,150	44,644	161	69
Katcha (Kordofan Province)	475	43,217	—	20
Lui (Equatoria Province)	1,412	109,268	243	50
American Mission				
Nasir (Upper Nile)	178	52,975	—	—
Akobo (Upper Nile)	250	12,396	—	—
Pibor (Upper Nile)	24	11,815	—	—
Sudan United Mission				
Taybania (Kordofan)	187	24,296	—	—
Abri (Kordofan)	939	75,808	—	20
Kawda (Kordofan)	342	18,707	—	18
Heiban (Kordofan)	467	34,356	—	16
Nyokama (Kordofan)	498	14,449	—	—
Salara (Kordofan)	148	12,592	—	20
Sudan Interior Mission				
Abayath (Upper Nile)	—	9,854	—	—
Banyong (Upper Nile)	150	5,965	—	—
Doro (Upper Nile)	133	17,372	50	—
Total	6,353	487,814	454	213

MEDICAL TRAINING

School of Hygiene. During the year 38 students were under training. Of the 10 students who sat for the R.S.H. examination in April 1959, seven passed the examination. The other three have been deferred for a period of 3 months.

Twelve sanitary overseers have received a course of training in the school. An examination was set at the end of the course with a satisfactory result.

Five Health Visitors have attended the course for public health during the year. An examination was set with a passing result for all candidates.

Medical Assistants Training School. 39 students were under training during the year. 28 have passed and were qualified in October 1957.

A number of books was added to the school library, some of which were presented by UNICEF.

Nurses Training School. 282 Mumarideen and 60 Mumaridat sat for the final Nursing Examination. Successful candidates were 193 Mumarideen and 44 Mumaridat.

Laboratory Technicians and Assistants

7 laboratory technicians and 6 laboratory assistants are under training.

Radiographers : 8 students are under training.

Dispensers. 5 students are under training.

CHAPTER VIII

Laboratory Services

(a) STACK MEDICAL RESEARCH LABORATORIES

By

Dr. M. A. Haseeb

This report covers the period from July, 1st 1957 to June 30th 1958. During this period ad hoc research was carried out on Kala-Azar, Influenza, Onchocerciasis, Yellow Fever, Blood and Neoplasms. Summaries of these and other research activities will be found under the appropriate headings.

As in last year a great part of the time of the staff was devoted to the teaching of laboratory technician trainees recruited from the Secondary Schools.

Among visitors to the laboratories were Professor Spooner, Professor of Bacteriology and Immunology and Head of the Bacteriology Department at the London School of Hygiene and Tropical Medicine. The visit of Professor Spooner, who spent few days in Khartoum was most useful in advising on further teaching of the technicians. Professor Spooner is also the President of the Institute of Medical Laboratory Technology, London.

The writer attended an international Symposium on "abnormal haemoglobins" organised at the University of Istanbul by the Council for International Organisations of Medical Sciences (CIOMS) with the help of a grant from the Rockefeller Foundation. The study of Abnormal Haemoglobin is essential to elucidation of the underlying causes of various pathological conditions.

EDUCATION AND ROUTINE ACTIVITIES

Ten laboratory assistants were given refresher courses of two to three months duration on advanced laboratory technique including the Kahn Test. It was also possible to give training to members of the staff of the Faculty of Medicine, University of Khartoum on breeding and care of Laboratory animals.

Six laboratory assistants were trained and employed to fill vacancies in the newly built hospitals or to augment the staff in big hospitals in the country.

Two female students from the Nursing College Khartoum were given practical classes in bacteriology, parasitology, haemotology and other laboratory tests.

As usual the teaching of theoretical and practical bacteriology and parasitology to the Medical Students of the Faculty of Medicine, University of Khartoum and also the teaching of Forensic Medicine to the same students and tho students of the Police College, Khartoum, have made heavy demands on the time of the Laboratory Staff.

TECHNICIAN CLASS

The seven technician trainees who were recruited from the secondary schools in September 1956, continue to receive training throughout the year.

One of the two laboratory technicians, who were sent to the United Kingdom to undergo further training to enable them to sit for the Institute of Medical Laboratory Technology, was successful in passing the intermediate examination of the Institute and becoming a member. His studies in the U.K. were extended to enable him to sit for the final examination and to become an associate. The other technician was not allowed to sit for the Intermediate examination because of his general education. He will be recalled to the Sudan where he can try again to obtain the required educational qualification.

Two Fellowships were obtained from the World Health Organisation to enable two technicians to spend one year each in the American University of Beirut to undergo refresher courses on bacteriology, biochemistry and haemathology.

ROUTINE WORK

A summary of the work and researches carried out during the period under review is appended to the report. The total number of examinations was 34,981 as compared with 42,436 in the previous year and 31,880 in 1955-56.

As in previous years histological work of rather highly specialised type continues to increase ; demands for examinations, of testicular and endometium biopsies are still increasing.

Demands for testing organisms for their sensitivity to anti-biotics became routine requests. It is noted that most *Staphylococci* became insensitive to penicillin.

Forensic medicine : there is a great increase of Medico-legal work requested by the Police. The demands cover stains for human blood, seminal fluid, plant poisons etc. It is high time that separate laboratories for forensic medicine be considered, as the work requires a great deal of time and devotion.

The issue of lymph vaccine was 2,500,000 doses this year compared to 1,068,000 doses last year. The demand for anti-rabic vaccine also increased from 489,200 doses last year to 526,500 this year.

POST-MORTEM EXAMINATIONS

34 post-mortem examinations were performed in Khartoum Civil Hospital in the year under review, of which 24 were medico-legal.

PATHOLOGICAL SPECIMENS

The total was 927 excluding brains for rabies, the total of the previous years was 1044.

NEOPLASMS

109 neoplasms were received of which the following table is a summary.

Site	Carcinoma	Sarcoma	Melanoma	Mixed Tumour	Total
Cervix	18	2	—	—	20
Neck	1	—	—	—	1
Breast	16	—	4	1	21
Mesenteric gland...	2	—	—	—	2
Tonsils	2	—	—	—	2
Leg	3	2	—	—	5
Thyproid	1	—	—	—	1
Abdominal	—	2	—	—	2
Liver	2	—	—	—	2
Eye	4	—	—	—	4
Rectum	2	1	—	—	3
Lip	3	—	—	—	3
Ulcer	4	—	—	—	4
Bronchus	3	—	—	—	3
Conjunctival	1	1	—	—	2
Maxillary	2	—	—	—	2
Heel	—	—	1	—	1
Subcutaneous mass	1	—	—	—	1
Nose	2	—	—	—	2
Parotid	—	—	—	5	5
Bladder	5	—	—	—	5
Axillary	1	—	—	—	1
Salivary glands	1	—	—	—	1
Urethra	1	—	—	—	1
Autopsy	—	1	—	—	1
Heart	5	—	—	—	5
Thumb	2	—	—	—	2
Lung	2	—	—	—	2
Prostate	3	—	—	—	3
Toe	2	—	—	—	2
Total	89	9	5	6	109

RABIES

384 brains were received of which 36 were decomposed and useless for examination; of the remaining 80 were positive for negri bodies. This contrasts with 70 positive out of 306 received last year.

The species and distribution of the positive and negative in the past year's series is shown in the following table.

Rabies Examination

Name	Positive	Negative	Decomposed	Total
Dog	60	219	8	287
Donkey	9	15	1	25
Camel	1	2	3	6
Gazelle	—	1	—	1
Monkey	—	6	4	10
Cattle	1	8	1	10
Goat	3	—	14	17
Bull	—	1	1	2
Cat	2	10	3	15
Sheep	1	4	—	5
Horse	2	1	—	3
Unknown	1	1	1	3
Total	80	268	36	384

RABIES VACCINE

526,500 mls. were issued this year compared with 489,200 mls. issued last year. The amount issued this year is sufficient to treat 7,225 cases. The animals used for the preparation of the vaccine are goats and the technique is that recommended by the W.H.O. Seminar at Muguga, Nairobi 1955. As a result of this technique the chances of sepsis were cut out altogether. Anti-rabic treatment is decentralised and therefore a certain amount of waste in the vaccine is bound to take place.

LYMPH VACCINE

125 sheep were used for the production of 7,060 grams of pulp with an average of 56 gm. per sheep.

Owing to the occurence of small outbreaks of small-pox in various parts of the country mass vaccination campaigns were carried out in the infected Provinces.

A freeze-dry apparatus has been obtained and a laboratory technician has been trained by Messrs Edwards, London, on its use. The production of dry small-pox vaccine will be started in due course.

POLIOMYELITIS

The results of the survey for polio-virus anti-bodies in Khartoum city and Kassala rural district have now been completed and published (Haseeb, M. A. (1958). J. Trop. Medicine and Hyg.). It would appear from the results that infection with polio in the Sudan, occurs early in life. It is concluded that mass vaccination against polio is not indicated now in the Sudan. Newcomers to the country are certainly advised to be immunised before arrival.

BLOOD

The writer attended a training course held in September, 1957 under the auspices of the UNESCO Middle East Suice Cooperation Officer, in the University of Istanbul. This course was attended by delegates from the Mediterranean countries concerned with abnormal haemoglobin and thalassaemia. The course was instructive because since Pauling's discovery in 1949 that the haemoglobin of patients suffering from sickle cell anaemia differed from normal haemoglobin, there had been rapid progress in the field of the hereditary anaemias.

In normal man there are two physiological haemoglobins : the haemoglobin of the human foctus (E : foetal haemoglobin) and the adult haemoglobin (Haemoglobin A). In the last decade a number of haemoglobin variants have been described. The first of those to be described is Haemoglobin S (sickle cell anaemia). The others are labelled HB-C, HBD, HB-E, HB-G, HG-H, HG-I, HG-J, HG-K, HG-L, and HG-M. They are all permanent and inherited and they are due to difference in the globin.

The name haemaglobinopathies has been proposed for this group of diseases with which thalassaemia is to be included.

The study of these haemaglobinopathies is important for the following reasons :

1. It is necessary to distinguish these hereditary anaemias from those due to iron deficiency and those caused by malaria or intestinal parasites.

2. When one or both parents are heterozygous for one of the diseases it is likely that the abnormality will occur in the offspring.

3. The carriers of the sickle cell and cookey genes enjoy a certain protection against malaria. It is important, therefore, to determinate the percentage of the carriers of sickle cell and thalassaemia genes in areas where malaria is common.

4. Low values of haemoglobin concentration found in survey may be caused by the presence of certain haemoglobinopathies.

5. Individual heterozygous for one of those haemoglobinopathies are common in many parts of the world.

In the Sudan as was reported in previous years the sickle cell trait is present in various parts of the country.

SCHISTOSOMIASIS

Two significant publications on Schistosomiasis in the Sudan appeared during the period under review. Emil Abdel Malek (1958) (Bull. World Health Organisation) discussed the distribution of the Intermediate Hosts of Bilharzia in Relation to Hydrography. With special reference to the Nile Basin and the Sudan and also the " Factors conditioning the Habitat of Bilharziasis Intermediate Hosts of the family Planorbidate."

Useful information on the Sudan Malacology is now available.

The sub-genus Bulinus (Physopsis)

B. (Physopsis) ugandae extends along the Nile drainage from the central African lakes, occurring in the rivers (Bahr-El-Jebel and White Nile) and also in the ponds of the toich lands west of the Sudd. The species in the extreme south of the country is *B. (Physopsis)* globosus. The presence of this subgenus in the Blue Nile drainage is unconfirmed. It has not been found in the steppe region north of the Bahr-el-Arab.

The sub-genus Bulinus (Bulinus)

Widespread in the country, occurring in the following water bodies: the rivers derived from the Ethiopian plateau, even while in flood; the seasonal inland waters of the western steppe belt and the perennial streams of the Nuba and Marra Mountains; the White Nile and the Main Nile; and, in the south, the ponds and lakes of the Congo-Nile drainage of Bahr-el-Ghazal Province and also in the Sudd area. Fossil and subfossil finds in the arid Red Sea and Northern desert areas have shown that, outside the River Nile, this subgenus must have occurred further north in recent geological times. It is clear from the distribution records that an overlap with *Bulinus (Physopsis) ugandae* exists in the Bahr-el-Jebel and White Nile.

B. forskalii has a wide distribution in the Sudan, where it is found in slowly flowing water with plenty of aquatic vegetation. It occurs in the south, in khors leading to the Bahr-el-Jebel, in the Sudd region, in the toich land of Bahr-el-Ghazal, on the swampy banks of the White Nile, in the Nuba Mountains and in some inland rain pools in Darfur. The snail is rare in the Blue Nile and in the irrigation canals of the Gezira. It was not found in the higher reaches in Jebel Marra, but it may possibly be present in these streams at lower altitudes.

THE GENUS BIOMPHALARIA

In recent medical and other literature the Biomphalaria of the Sudan have often been called *B. boissyi*, the name of the species found in the Egyptian Delta. In fact confusion between the shells of *B. sudanica* and *B. boissyi* is comprehensible, while *B. ruppellii* resemble young *B. boissyi*. *B. berbini*, a name met in the early literature, is presumably a synonym of *B. ruppellii* (Pilsbry and Bequaert, 1927), and *B. paeteli* seems to correspond to *B. boissyi*.

Biomphalaria sudanica was collected from rainwater lakes and swamps in Bahr-el-Ghazal Province, from various parts of the Sudd region in Upper Nile Province, and in the White Nile as far north as Kosti, where a number of papyrus islands are grounded on the river bank.

Biomphalaria adowensis was found in the Congo-Nile drainage of Bahr-El-Ghazal Province, where it makes its home in ponds, at the dead end of khors, or in temporary swamps of slowly flowing tributaries ; it was also found in the Bahr-el-Arab, near Safaha.

Biomphalaria ruppellii in the Sudan is the species of Biomphalaria found in rivers (Bahr-el-Jebel, White Nile) and irrigation canals. It occurs as far north as the Zeidab Agricultural Scheme. Specimens were not found in the Blue Nile itself, although present, if not common, in one of its tributaries, the Dinder River. In certain places in the Sudd it occurs together with *B. sudanica*, and it was also found in the toich land of Bahr-el-Ghazal.

The Biomphalaria recorded for the first time from western Jebel Marra have been provisionally assigned to *B. pfeifferi ugandi*, Records of Biomphalaria from the south-eastern plains on either side of the Ethiopian border would need to be followed up to determine specific relationships. Fossil and subfossil finds of Biomphalaria also indicate that it formerly had a more northerly distribution in now arid territory.

In the second article Abdel Malek examined certain physical, chemical and biological characteristics of water-bodies which made them suitable or unsuitable as habitats for planorbid snails acting as vectors of bilharziasis. The principal conditioning factors appear to be : amount of food available ; extent of the growth of aquatic weeds ; oxygen content of the water ; amount of sunlight able to penetrate the water ; strength of the current ; nature of the substratum ; ionic composition of the water ; and presence or absence of parasites. Several of those factors are interdependent. However, the data available are still too scanty for an exact assessment to be made of the importance of individual environmental factors in controlling the size of vector populations.

LEISHMANIASIS

Since its discovery by Neave (1904) kala-azar in the Sudan has always been characterised by its paucity and erratic distribution, but for small outbreaks in military posts. In 1956 a violent epidemic blew up in areas that used to be loosely endemic. During the period under review small outbreaks occurred in Upper Nile Province and Kurmuk-Roseries area. Few cases relapsed even after complete course of Pentostam, and it was found necessary to give up to 14 injections. Cases resistant to Pentostam were given Pentamidine with benefit.

The search for an animal reservoir in the endemic areas has not yet been fruitful.

INFLUENZA

A widespread outbreak of influenza was reported from various Provinces in the Sudan and early in August, 1957 most Provinces were infected. The symptoms on the whole were mild and characterised by respirating signs including coryza, sore-throat and cough. Prostration and toxaemia, were marked only in a few cases, but usually the disease was self limiting and ended in recovery in four to six days. Complications were extremely rare.

Throat washings from patients in the early days of the disease were collected and sent to Dr. C. H. Andrews of the World Influenza Centre, London and also other samples were sent to Dr. Awad, Director of the Serum and Vaccine Institute, Agouza, Cairo.

The samples sent were altogether 82 in number. Examination of the samples and typing by haemoglutination inhibition tests proved that the Sudan strain was identical with influenza virus A/1/57 Singapore (Asiatic).

WIDAL REACTIONS

	July	August	September	October	November	December	January	February	March	April	May	June	Total
T	10	16	15	19	25	16	16	15	17	10	21	28	208
A	1	—	1	—	—	—	4	1	4	4	4	1	20
B	1	—	2	8	9	6	11	3	11	7	6	1	65
M	2	2	5	12	7	3	9	7	5	1	4	6	63
Negative	119	114	173	221	110	202	197	189	211	165	301	180	2,182
TOTAL	133	132	196	260	151	227	237	215	248	187	336	216	2,538

BLOOD CULTURE

	July	August	September	October	November	December	January	February	March	April	May	June	Total
T	—	—	—	6	3	9	5	9	3	1	4	1	41
A	—	—	—	—	—	—	—	—	1	—	—	—	1
B	—	—	1	—	—	—	—	—	1	—	—	—	2
M	—	—	—	—	—	—	—	—	—	—	—	—	—
O.O	1	3	2	2	2	13	10	12	3	6	3	1	58
Streps	—	2	—	—	—	—	—	—	—	—	—	—	2
Sterile	61	52	90	80	68	79	54	53	69	55	92	52	805
Contaminated	36	38	50	65	51	49	61	59	71	56	101	62	699
TOTAL	98	95	143	153	124	150	130	133	148	118	200	116	1,608

MALARIA

	July	August	September	October	November	December	January	February	March	April	May	June	Total
B.T.	—	—	—	—	—	—	—	—	—	—	—	—	—
M.T.	—	1	—	1	—	—	3	1	—	—	—	—	6
Q.T.	—	—	—	—	—	—	—	—	—	—	—	—	—
D.I.	—	—	—	—	—	—	—	—	—	—	—	—	—
Negative	191	26	65	57	167	91	77	121	74	22	44	89	1,024
TOTAL	191	27	65	58	167	91	80	122	74	22	44	89	1,030
K.A.	—	—	—	—	—	—	—	—	—	—	—	—	—
R.F.	—	—	—	—	—	—	—	—	—	—	—	—	—
Blood Counts ...	10	20	16	7	11	10	14	13	11	4	6	7	119
Weil-Flix	—	—	—	—	—	—	—	1	—	1	—	—	2
Positive...	—	—	—	—	—	—	—	—	—	—	—	—	—
Negative	—	—	—	—	—	—	—	1	—	—	—	—	1
TOTAL	10	20	16	7	11	10	14	15	11	5	6	7	122
Hetrophile	—	—	5	1	—	—	—	—	—	1	1	1	9
Positive...	—	—	—	—	—	—	—	—	—	—	—	—	—
Negative (9)													
TOTAL	—	—	5	1	—	—	—	—	—	1	1	1	9
MONTHLY ...	10	40	37	8	22	20	28	30	22	11	13	15	256
TOTAL	432	294	441	479	464	488	475	500	492	337	593	436	5,431

FAECES

	July	August	September	October	November	December	January	February	March	April	May	June	Total
Flexneri	3	1	3	1	2	2	1	3	—	—	2	—	18
Shiga	—	—	—	—	1	—	3	2	1	—	—	—	7
Alkalecens	—	—	—	—	—	—	—	—	—	—	—	—	—
Ambigium	—	—	—	—	—	—	—	—	—	—	—	—	—
Sonnes	—	—	—	—	—	—	—	—	—	—	—	4	4
T	—	—	—	—	—	1	—	2	—	—	—	—	3
A	—	—	—	—	1	—	—	—	—	—	—	—	1
B	—	—	2	—	—	—	—	—	—	—	—	—	2
Amoeba	2	—	—	—	1	1	—	—	1	1	—	1	7
Ova	—	3	2	—	1	3	3	4	3	4	1	1	25
Negative	74	143	210	205	226	143	137	118	128	108	101	93	1,686
TOTAL	79	147	217	206	232	150	144	129	133	113	104	99	1,753

URINES

	July	August	September	October	November	December	January	February	March	April	May	June	Total
T	—	—	—	—	1	1	—	1	—	—	—	—	3
A	—	—	—	—	—	—	—	—	—	—	—	—	—
B	—	—	—	—	—	—	—	—	—	—	—	—	—
M	—	—	—	—	—	—	—	—	—	—	—	—	—
Ova	—	1	—	—	3	—	3	1	2	—	—	—	10
Negative	80	116	95	167	211	152	165	138	140	124	140	122	1,650
TOTAL ...	80	117	95	167	215	153	168	140	142	124	140	122	1,663
MONTHLY ...	159	264	312	373	447	303	312	269	274	237	244	221	3,415
C.S. Fluids	28	34	45	32	36	29	31	61	53	33	21	27	430
Positive...	—	1	3	17	34	32	16	19	9	6	—	—	137
C. Diph. Negative ...	91	105	128	179	300	231	186	200	157	113	102	77	1,869
Virulence tests... ...	—	—	—	—	—	—	—	—	—	—	—	—	—
Positive...	1	5	1	1	—	3	7	6	2	1	—	1	28
Supta Negative ...	17	36	36	11	29	61	31	36	18	12	9	8	304
Gem. Bact.	157	232	281	246	275	339	241	299	259	192	241	200	2,962
Biochem.	298	261	279	202	213	219	135	253	286	117	159	127	2,549
TOTAL	592	674	773	688	887	914	647	874	784	474	532	440	8,279

KAHN TESTS

	July	August	September	October	November	December	January	February	March	April	May	June	Total
Positive...	132	182	144	195	183	223	255	307	251	98	186	123	2,279
Negative	1,070	1,218	1,242	1,492	1,243	1,294	1,365	1,221	1,380	811	1,581	992	4,909
TOTAL	1,202	1,400	1,386	1,687	1,426	1,517	1,620	1,528	1,631	909	1,767	1,115	17,188

SUMMARY OF LABORATORY EXAMINATION

	Khan Test	Blood	Stool and Urine	General bact and Biochem.	Histopath	Total
July	1,202	432	159	592	94	2,479
August	1,400	278	264	674	88	2,704
September	1,386	420	312	641	73	2,832
October	1,687	378	688	688	69	3,195
November	1,434	456	447	887	89	3,313
December	1,517	453	302	914	78	3,264
January	1,620	462	314	640	67	3,103
February	1,528	482	269	871	76	3,226
March	1,631	480	274	884	66	3,335
April	909	330	237	475	71	2,022
May	1,767	536	244	582	124	3,253
June	1,115	418	221	469	32	2,255
TOTAL	17,196	5,125	3,416	8,317	927	34,981

Positive	80
Negative	268
Rabies examination decomposed	36
TOTAL	384

Vaccines issued during 1957-58

T.A.B.	117,959 ml
Anti Rabic	526,500 ml
Staphylococcus	470 cc.
Doses of vaccine lymph	2,500,000 doses
Cholera	95,100 ml.

List of Publications during the year by Members of the Staff

Name and Initials of Author	Date of Publication	Title of Article	Title of Journal in which Published	Volume Number of Journal	Page Number of Journal
M. A. Haseeb	November 1958	Fatal Effects of Heat	J. Trop. Med. and Hyg. London	Vol. 61 No. 11	Page 280
M. A. Haseeb	In Press	Poliomyelitis in the Sudan.	J. Trop. Med. and Hyg. London		

(b) MEDICAL ENTOMOLOGY

By

M. Qutubuddin

Work in the Section continued this year also almost on the same lines as during the year 1956 57, viz., 1. Identification of Anopheline and Culicine mosquitoes collected by the staff of the Section as well as those received from various places in the country. 2. Collection and identification of sandflies from the Kala-Azar areas. 3. Identification of several other insects of medical importance received from various parts of the country. They comprised 1. *Sarcophaga, Calliphorid* flies, tabanids and insects of other orders such as Coleoptera and Hemiptera. In addition to this, the Section this year was occupied with the work of nimitti control which involved the identification and assessment of density of a vast variety of planktonic fauna collected with the help of tow-nets at various points in the Nile from Sennar to Khartoum. Since it was decided to launch in collaboration with W.H.O. a campaign of control of the green *nimitti* which comprises a number of Chironomids most of which are *Tanytarsus lewisi* Freeman swarming round lights at Khartoum, in billions, it was felt necessary that the pre spray data of the pest should be collected to enable comparison with the post-spray figures. The second pest which merited attention of the Section was *Simulium* in the Northern Province from where a few cases of *Onchocerciasis* were reported. The Medical Entomologist visited Abu Hamad and several places around it in January, 1958. Since then parties from the Section made a further survey of the area. This work will be continued after the river recedes appreciably. Details of the work mentioned above are given in the following.

Mosquitoes

Appendix A gives the number of species identified in collections containing larvae and adults received from different parts. In all 7 species of Anopheline and 21 species of Culicine mosquitoes were recognised and reports sent to the senders of specimens.

In Wadi Halfa from Saras to Faras where *Anopheles Gambiae* has been reported as exterminated since 1945, parties from the Section visiting the area check up once in 3 or 4 months. While there is reason to believe that so far the mosquito has not re-established itself in the area, there is no ground for complacency and in view of the importance of the area, a strict control of the breeding should be maintained.

A very successful lab. colony of the yellow fever mosquito *Aedes aegypti* (L) has been maintained for over a year now for which special care had to be taken particularly in the hot months. More about this colony will be described under the heading Hatchery.

Sandflies

Ever since the outbreak of Kala-Azar in July, 1956 in an epidemic form in the Fung, the study of the sandfly fauna in this and other areas has been intensified and an enormous collection has been made a part of which is still being identified. Dr. M. H. Satti of the Stack Medical Research Labs. who was assisted by the staff of this Section, also sent collections of sandflies from many places that have been identified. Appendix B gives details of the species recognised in different parts.

While on leave in London the Medical Entomologist took with him a large collection of sandflies for study there as more literature was available for study in the British Museum and the L.S.H.T.M. where he was engaged in research for about 4 months. It is interesting to note *Phlebotomus marini* was found in termite hill fauna sent by Dr. Satti.

The Green Nimitti

After a talk with the Director Medical Services in respect of control of the green *nimitti* at Khartoum in the light of Professor A. W. A. Brown's suggestions, the Medical Entomologist formulated a list of requirements etc. for collecting pre-spray data, most of which were approved in a meeting held at the H.Q. on 17.9.1957 presided by Dr. Ali Kheir, Assistant Director Public Health and attended by Prof. Brown, Sayed Khalafalla Babiker, the Government Analyst and members of the Sudan Pest Control Organization and the Medical Entomologist. After collection the pre-spray figures which have been sent from time to time to the Ministry of Health and all concerned a portion of the Nile above Sennar was treated with 500 lbs. of DDT by Prof. Brown in collaboration with the Section and the Sudan Pest Control, the details of which have already been given in correspondence with the H.Q. After this spray, tow-net catches at Maiyurno, Sennar, Medani and Khartoum were continued and extensive data were collected and sent to Prof. Brown. It may be mentioned here in passing that apart from *Tanytarsus* larvae and pupae, a very large number of other Chironomids such as *Procladius*, pentaneura and *Tanypus* were collected with an enormous number of *Crustacea*, and *Chaoborus* larvae pupae as also *Ceratopogonid* larvae. In each catch all these were counted and figures noted.

All the post-spray figures and other relevant facts were placed by the Medical Entomologist for consideration before a meeting held on 19th February, 1958 at the H.Q. Ministry of Health presided over by Dr. Ali Kheir, and attended by Prof. Brown, Sayed Khalafalla Babiker and others. As it was subsequently made known to all concerned, the campaign did not result in the success that was expected. However, it was concluded that it has thrown light on some useful aspects of the problem. It was decided that a second spray should be done immediately at El Masid which could not be possible owing to want of DDT.

Recommendations have been made by Prof. Brown and requirements asked for by this Section in a recent letter to the H.Q.

Simulium

The incidence of *Onchocerciasis* in the Northern Province around Abu Hamad led to a preliminary investigation of the Entomological problem in the area. The places visited by the Medical Entomologist were Abu Hamad, Shereik, Abu Dis, Abu Hasheem, Nadi, Mugrad Island and Abu Tien.

Control

Research work proved so far that larval treatment is more economical than the adult killing by residual insecticides sprayed on vegetation on which the fly rests.

Treatment of river edges about 2-3 yards from the bank with a ppm. DDT should give about 100 per cent kill in the early stages.

Hatchery

Laboratory colonies of various strains of *Aedes aegypti* are being maintained in the Hatchery, which is used as a test for bioassay of insecticides received for testing.

While returning from London the Medical Entomologist visited the W.H.O. Office at Geneva and requested Dr. Bruce Chwatt to send us the larval and adult testing kits standardised by the W.H.O. of which the test kit for determining the susceptibility or resistance of mosquito larvae to insecticides has been received. The local strain of *Aedes aegypti* (L) is being tested for resistance, if any, since the problem of resistance to insecticides in this mosquito and other disease-carrying insects has become very serious.

Insecticides

Experiments with various insecticides both Chlorinated Hydro-Carbons as well as the Phosphorus Organic Compounds are being conducted in the lab.

A. Chlorinated Hydro-Carbons

1. D.D.T.	2. Dieldrin	3. Gama B.H.C.
4. Lindane	5. Endrin	6. Toxaphene

B. 1. Dipterex 2. Metasystox 3. Gusathion
4. Thanite

Number of Public Health Workers Trained

During the year four Public Health Officers, 2 Assistant Sanitary Overseers and 15 mosquito men were trained. Some of the nursing staff from Wad Medani Hospital visited the Section for studying some insects of medical importance.

Appendix A

Place	Ref. No.	Identification	Remarks
Tibna	2070	*Aedes aegypti*	
Umm Sereiha ...	,,	,, ,,	
Jabr el Dar	2074	,, *vittatus*	
Wadi	,,	*Toxorhynchites*	
Abu Gebeiha	,,	*Aedes aegypti*	
Port Sudan	2078	*Laptodermus bicolor*	
Wad Medani	2099	*Aedes metallicus*	
,, ,, ...	,,	,, *unilineatus*	
,, ,, ...	,,	,, *toylori*	
,, ,, ...	,,	,, *aegypti*	
El Obeid	2076	,, ,,	
,, ,, ...	2077	*Culex poicilipes*	
Bara	2079	*Anopheles gambiae*	
,, ...	,,	*Culex univittatus*	
,, ...	,,	,, *nebulosus*	
,, ...	,,	*Aedes metallicus*	
El Obeid	2081	*Culex univittatus*	
,, ,, ...	,,	,, *nebulosus*	
Juba	2087	*Aedes aegypti*	
,, ...	,,	*Anopheles gambiae*	
,, ...	2058	*Aedes (B) lineatopennis*	
,, ...	2090	*A. pretoriensis*	
,, ...	,,	*C. ethiopicus*	
,, ...	,,	*A. rhodisiensis*	
,, ...	,,	*C. poicilipes*	
,, ...	,,	*Ficalbia* (M) sp.	
,, ...	,,	*A. pharoensis*	
,, ...	,,	,, *coustani*	
,, ...	,,	*Ficalbia* (M) hispida ?	
,, ...	,,	*C. univittatus*	
Wau	2100	*C.* sp.	
,, ...	,,	*Aedes aegypti*	
,, ...	,,	*A. gambiae*	
,, ...	,,	*Taneiorhynchus* (Coq.) aureus	
Maridi	2087	*Anopheles nili*	
,, ...	,,	,, *gambiae*	
,, ...	,,	*Culex univittatus*	
Torit	,,	,, *decens*	
,, ...	,,	*Aedes aegypti*	
,, ...	,,	*Culex duttoni*	
,, ...	,,	,, *pipiens*	
Gilo	,,	*Aedes aegypti*	
,, ...	,,	*Culex nebulosus*	
Karary	2089	,, *tigripes*	
,, ...	,,	,, *nebulosus*	
,, ...	,,	*Anopheles revulorum*	
Lafon Mt.	,,	*Aedes minutus*	
Kopoita	,,	,, ,,	
Nimuli	,,	*Anopheles coustani*	
,, ...	,,	,, *gambiae*	
,, ...	,,	*Culex simpsoni*	
,, ...	,,	*Aedes aegypti*	
Ashawo	,,	*Anopheles gambiae*	
Nimuli	,,	*Culex nebulosus*	
Loa	,,	,, *pipiens*	
,, ...	,,	*Anopheles nili*	
Yei	,,	*Aedes aegypti*	
,, ...	,,	*Culex decens*	
Nzara	,,	*Aedes aegypti*	

Place	Ref. No.	Identification	Remarks
Tumbura	2089	*Culex tigripes*	
,, ...	,,	,, *decens*	
Nzara	,,	,, *ethiopicus*	
Ezo	,,	*Anopheles coustani*	
Sources Yubu	,,	,, ,,	
,, ,, ...	,,	*Aedes aegypti*	
Amadi	,,	*Anopheles coustani*	
Yei	,,	*Culex cinereus*	
,, ...	,,	*Aedes metallicus*	
Kajo Kaji	,,	,, *aegypti*	
,, ,, ...	,,	*Culex decens*	
Iwatoker	,,	,, *nebulosus*	
,, ...	,,	*Aedes aegypti*	
Maridi	,,	,, ,,	
,, ...	,,	*Culex nebulosus*	
,, ...	,,	,, *decens*	
El Obeid	2081	,, *fatigans*	
Maridi	,,	*Simulium damnosum*	
Wadi Halfa	2101	*Anopheles pharoensis*	

Appendix B

Place	Identification	Remarks
Upper Nile	*P. antennatus*	
,, ,, ...	*P. bedfordi* var. *bereiri*	
,, ,, ...	*P. freetownensis*	
,, ,, ...	,, ,, var *sudanicus*	
,, ,, ...	*P. squamipleuris*	
,, ,, ...	*P. lesleyae*	
,, ,, ...	*P. orientalis*	
,, ,, ...	*P. roubaudi*	
,, ,, ...	*P. schwetzi*	
,, ,, ...	*P. clydei*	
Gedaref Area...	*P. clydei*	
,, ,, ...	*P. schwetzi*	
,, ,, ...	*P. freetownensis*	
,, ,, ...	*P. antennatus*	
,, ,, ...	*P. lesleyae*	
,, ,, ...	*P. bedfordi*	
,, ,, ...	*P. rodhaini*	
Juba Area	*P. martini*	
,, ,, ...	*P. antennatus*	
,, ,, ...	*P. clydei*	
,, ,, ...	*P. africanus*	
,, ,, ...	*P. schwetzi*	

LIST OF PUBLICATIONS DURING THE YEAR BY MEMBERS OF THE STAFF

Name and Initials of Author	Date of Publication	Title of Article	Title of Journal in which Published	Volume Number of Journal	Page Number of Journal
Mohamed Qutubuddin	Accepted for publication.	The Inheritance of D.D.T. Resistance in a Highly Resistant Strain of Aedes Aegypti (L)	Bulletin W.H.O. Geneva	—	—

(c) THE WELLCOME CHEMICAL LABORATORIES

By

Abdel Hamid Ibrahim

The Wellcome Tropical Research Laboratories were founded in 1903. The laboratories and the equipment together with a library and museum were a gift to the Sudan Government by the late Sir Henry Wellcome, and they were housed in the then Gordon Memorial College (now the University).

Dr. William Beam was appointed in 1904 as the first Government Chemist and the Chemical Section was opened. After the First World War, the Chemical Section expanded rapidly and branch laboratories were opened at Atbara and Wad Medani.

In 1935 the Wellcome Tropical Research Laboratories, Khartoum were disbanded, and the Khartoum Chemical Laboratories were placed under the control of the Ministry of Agriculture. In 1939 the laboratories were transferred to the Ministry of Health and they now form part of the Research Section of that Ministry.

It is now proposed that in the near future the three Laboratories that constitute the Research Section *i.e.* the Stack Medical Research Laboratories, the Wellcome Chemical Laboratories and the Entomological Laboratories, be joined in one Department under a Director of Research. This will help to co-ordinate the research work of the three Laboratories which is becoming increasingly important in pathology, nutrition and therapeutics. Combined new buildings for the proposed Department are being designed.

STAFF

(on 30th June, 1958)

Government Analyst

(Vacant)

Acting Government Analyst

Abdel Hamid Eff. Ibrahim Suleiman, M.Sc., (London), D.I.C.

Assistant Government Analysts

Riad Eff. Mansour.

Rifat Eff. Butros Salama, M.Sc., (London), D.I.C. (on study leave in U.K.)

Assistant Scientific Officers

Mubarak Eff. Ali Karrar, B.Sc., (London). (on study leave in U.K.)

(1 Vacancy).

Senior Technical Assistants

Abu Bakr Eff. Ahmed Akour.

Afifi Eff. Ahmed Hussein.

(1 Vacancy)

Technical Assistants

Mahdi Eff. El Tayeb Haboura.

Hassan Eff. Ahmed Yasin.

Salah el Din Eff. Bedawi el Sawahli.

Ahmed Eff. Abdulla Nagi.

Mahmoud Eff. Abdel Ghafoor.

Junior Technical Assistants

El Tahir Eff. Bedawi

Ali Eff. El Hag Ibrahim

Fadul Eff. El Rayih.

Librarian

El Fatih Eff. El Tahir Diab.

Clerk

Ibrahim Eff. Hamid El Bedawi

ADMINISTRATIVE REPORT

1. Staff

(i) Mr. E. H. W. J. Burden, B.Sc., F.R.I.C., the Government Analyst resigned from service and set off on his final leave on 12.3.1958.

Mr. Burden was appointed on short term contract on 1.11.1952 as an Assistant Government Analyst. His vast experience and ability in the field of Chemistry of Food and Drugs and Water Supplies was shortly recognised. When promoted to Government Analyst on 19.10.1955 he put in a tremendous effort to bring the Laboratories up to date in different fields of Analytical Chemistry. He revised most of the analytical methods, introduced new techniques and equipped the laboratories to cope with the increasing volume of work.

So it is with regret that we lose Mr. Burden's services, and wish him the best in his new career.

(ii) Rifat Eff. Butros, M.Sc., D.I.C., who is on a study course in U.K. since 1956 has successfully passed his M.Sc., (London) Examination in the Chemistry of Food and Drugs. He was also granted the Diploma of the Imperial College of Science and Technology. He should thus be congratulated on his fine achievements.

Rifat Eff. will continue for a further nine months to attend training and demonstration courses in Food, Drugs, Forensic, Pharmaceutical and Agricultural Chemical Laboratories in U.K.

(iii) Mubarak Eff. Ali Karrar, B.Sc., is also on a study course at Nottingham University, U.K. since last year. He is studying for B.Sc. Special Honours in Chemistry and may continue afterwards on a course of Pharmaceutical Chemistry. He has already passed his first year Examination with credit and was thus exempted from all ancillary subjects.

(iv) Riad Eff. Mansour was due for retirement by the end of 1957. His services were retained on contract as his vast experience is indispensible for these Laboratories at present.

(v) With the resignation of Mr. Burden the Government Analyst and the absence of Rifat Eff. Butros an Assistant Government Analyst and Mubarak Eff Ali Karrar an Assistant Scientific Officer on study leaves in U.K., the staff shortage has become more acute. Still an Assistant Scientific Officer post remains vacant for lack of suitable Sudanese chemistry graduates from Khartoum and other Universities. A post of a Senior Technical Assistant is also vacant and may be filled by promotion.

So at present the Laboratories are being run by a professional staff of two which is far from adequate in view of the increasing volume of highly technical work. But it is hoped that the staff position will improve by next year after the return of Rifat Eff. from abroad.

2. General

(i) *Equipment*

Two air coolers have been fitted in the Toxicology Laboratory which will help to make the work more accurate and reduce the hazards of the inflammable volatile and toxic solvents used. It is hoped that a third cooler will be fitted in the dark room for photo-developing and storage of stocks of volatile liquids.

A Gas Chromatography Apparatus has also arrived and this will help to open new fields of Research.

(ii) *Library*

38 new books have been added to the library, mostly covering the new fields of work undergone in the Laboratories.

(iii) *Visitors*

The Laboratories were visited on 3.9.1957 by Dr. Douglas Lee, Chief of Research, U.S. Office of Quartermaster General, and Dr. Ralph Siu, Technical Director U.S. Office of Quartermaster General.

Another visitor to these Laboratories on 13.7.1958 was Sayed Ahmed El Sawy the World Health Organisation representative, who was on a business trip to the Sudan.

ANALYTICAL REPORT

1. Summary

The following table shows the number of samples received in different categories during the last two years :

	1957/58	1956/57
Waters and Sewages	465	336
Foods	265	362
Drugs and Poisons	70	52
Clinical Specimens	8	8
Toxicological Specimens	137	141
Forensic Specimens	47	140
Edible Oils, Seeds and Oil Cakes ...	581	463
Damaged Materials	341	106
Miscellaneous	225	314
TOTAL	2,139	1,922

The following table gives the number of samples submitted by Government Departments and others.

	1957/58	1956/57
Ministry of Health	504	574
Ministry of Agriculture	41	58
,, ,, Animal Resources ...	18	52
,, ,, Commerce, Industry and Supply	2	5
,, ,, Communications	32	49
,, ,, Education	0	2
,, ,, Finance and Economics ...	27	40
,, ,, Mineral Resources ...	15	5
,, ,, Social Affairs	0	1
,, ,, Stores and Equipment ...	88	14
,, ,, Works	185	143
Mechanical Transport Department ...	3	1
Museums	1	0
Sudan Army	8	4
Sudan Police	32	154
Local Authorities	21	8
Khartoum University	10	12
Sudan Gezira Board	46	35
Equatoria Projects Board	0	1
Province Governors	2	0
Commercial Firms and Others ...	1,104	674

The Analytical Fees for commercial work totalled LS. 2,178.035 m/ms. compared with LS. 1,563 for last year.

There has been an 8 per cent increase in the number of samples analysed. We have nearly reached the level of our record for the year 1955 56 when 2221 samples were analysed. The volume of work done is actually more than the number of samples reflect. That is because with the revision of analytical techniques. more time and care is now taken to analyse or investigate samples properly.

As to Analytical Fees there was an even more marked increase of about 40 per cent. This is because of the substantial increase of samples from commercial establishments.

The Analytical Fees have so far remained constant since 1954. Meantime the cost of analyses have progressively increased with the increase in the cost of chemicals and apparatus. The Laboratories also had to be equipped with more expensive apparatus and chemicals for more precise work.

So the Analytical Fees are being revised and the new rates may come into operation shortly.

2. Water and Sewages

Samples of water and sewage were received from the following sources :—

	1957/58	1956/57
Ministry of Health	165	118
Drilling Engineer, Ministry of Works	185	126
Sudan Gezira Board	18	16
Khartoum Main Drainage Contractors	12	6
Other Sources	85	70
TOTAL	465	336

There is thus a marked increase in water samples submitted for analysis. This follows the expansion of drilling work done by the Ministry of Works all over the country. Public Health Authorities were also realising the importance of water analysis in the various health problems.

The following table gives details of some unusual waters received.

No.	SOURCE	Remarks	p.p.m.
C. 462	Marra, Well	Nitrate Nitrogen	73
C. 544	Sinkat, Well	Sulphates as (SO_4) ...	2,650
C. 619	Goz Beina, Bore 754	Nitrate Nitrogen	73
C. 1048	Domat, Bore 776	,, ,, ...	87
C. 1049	Fasher, Bore 794	,, ,, ...	116
C. 1152	Goz Marafeet, Well	Total Solids	8,100
		Sulphates as (SO_4) ...	3,220
C. 1329	Dariba (small lake)	Total Solids	4,200
		Excess Alkalinity as (Na_2CO_3)	2610
		Fluoride as (F)	48
C. 1330	Dariba (large lake)	Total Solids	13,920
		Excess Alkalinity as (Na_2CO_3)	8,890
		Fluoride as (F)	100
C. 1437	Sodari, Bore 820	Total Solids	14,320
		Total Hardness as ($CaCO_3$)	6,800
		Chlorides as (Cl)	7,150
		Nitrate Nitrogen	102

No.	Source	Remarks	p.p.m.
C. 1438	Khor Arbaat, Bore 811	Nitrate Nitrogen	44
C. 1544	Kabota, Bore 828	Sulphates as (SO_4) ...	2,400
C. 1658	Hillat El Sangaka, Well...	Nitrate Nitrogen	580
C. 1727	Managil Bl. No. 59 Bore 789	Total Solids	9,000
		Chlorides as Cl	5,100
C. 1728	Managil Bl. No. 60 Bore 790	Total Solids	16,000
		Chlorides as Cl	8,100
C. 1729	Mungata H.Q. Bore 804...	Total Solids	23,500
		Chlorides as Cl	14,700
C. 1732	Halaib, Well	Total Solids	9,160
C. 1867	Abu Saad, Well	Nitrate Nitrogen	320
C. 1868	Fasher, Well	,, ,, ...	110
C. 1957	Ban Gadeed, Well No. 1	Total Solids	7,480
		Nitrate Nitrogen	870
C. 1959	Tama, Well No. 2B	Nitrate Nitrogen	145
C. 1960	Gabarona, Well No. 3	,, ,, ...	232
C. 1979	Id El Towal, Well No. 4	,, ,, ...	87
C. 2052	El Khisheim, Well	,, ,, ...	102

It is apparent from the above table that high nitrates in water are still the main problem in many areas. It is a pity that in most cases high nitrates in water are associated with areas where water is usually scarce.

Sample No. C. 1867 above, taken from a well in Abu Saad was presented by the authorities after being fatal to cattle in about one and a half hours after watering. Its high nitrate content was the only chemical constituent that would explain such fatalities.

Another feature of high nitrates in bore-hole waters is that its concentration may fluctuate considerably. A water may be passed as suitable for human and animal consumption having a lower nitrate concentration than our maximum limit of 50 p.p.m. of Nitrate Nitrogen. Then a month later it might increase to a potentially dangerous concentration. For example water from Goz Beina fluctuated between 45 and 93 p.p.m. ; Domat between 44 and 87 p.p.m. ; while water from Fasher fluctuated in the dangerous range of 87 to 230 p.p.m. Nitrate Nitrogen. It is noticed that the nitrates are usually higher in the dry season which is only natural.

Now, any water that contains over 30 p.p.m. of Nitrate Nitrogen is passed as fit for human and animal consumption, but the nitrate concentration is checked by monthly sampling to ensure that it will fluctuate within safe limits.

SEWAGES

The analysis of sewage effluents that was started last year for Khartoum Main Drainage Scheme was continued for some time. An Anhydric Incubator was set up for the determination of Biological Oxygen Demand (B.O.D.) in five days at 20°C. B.O.D. was determined before at room temperature (*i.e.* over 30°C) which fluctuated considerably. This incubator will help to give accurate recognised results under standard conditions.

3. Foods

The following samples were received during the year :

	1957/58	1956/57
Official Samples	174	294
Other Samples	91	68
TOTAL	265	362

Official samples are usually sent by Public Health Authorities in order to test for absence of adulteration, fitness for human consumption and quality control. The other samples come from Departments other than the Ministry of Health and various firms and private concerns. The Customs send samples for quality control of their own imports (*e.g.* sugar), and for estimation of Customs dues on other articles of food and drinks *e.g.* imported ghee and its substitutes and alcoholic prinks. The Ministry of Agriculture and The Gezira Board also send some of their food products for quality analysis.

The following table gives a summary of the different types of foods and drinks analysed :

DESCRIPTION	Number of Samples
Alcoholic Drinks	5
Beans-canned	3
Biscuits	11
Bread	10
Caviar-Butarikh	1
Cheese-processed	4
Coffee	17
Cereal grains	11
Dates	2
Figs	1
Fish-dried	7
Flour-wheat	28
Flour-dura	1
Fruits-canned	2
Ginger	1
Ginger Ale	6
Honey	10
Jams and marmalade	5
Lentils	1
Milk-raw	64
Milk powder	2
Pepper	1
Semn	2
Semn substitutes	3
Soup-dry	1
Squash	6
Sugar	19
Sugar beet	25
Sugar cane	7
Sugar residues	1
Sugar melon	1
Sweetmeat	1
Sweets	1
Tea	4
Tomato puree	6
Vegetable oils	2
Vinegar	2

Raw Milk

Raw Milk	Number of samples
Official samples	44
Other samples	20
Total	64

Unfortunately our Hortvet Cryoscope was accidentally broken last year. Hence we lost the only recognised apparatus that could detect any adulteration by added water. We had to revert back to Specific Gravity, Fat and Solids not Fat determinations. The generous minimum standards of 3.0 per cent Fat and 8.0 per cent Solid not Fat were adopted and hence only gross adulteration by added water was detectable.

Nevertheless from the 44 official samples received 10 samples were below the above limits and were presumed adulterated by added water.

Now a new Hortvet Cryoscope was brought into operation and Freezing Point determinations were resumed.

Sugar

In most cases samples were submitted by the Customs Department for quality control. One sample was taken from a consignment of brown sugar which had an objectionable smell. This was found to be due to residual organic matter from sugar beet which had decayed in the warm humid atmosphere. The importation of brown sugar has since been stopped.

Squash

Bottles labelled " Pure Orange Juice " were found to be a flavoured coloured syrup containing a maximum of 3 per cent orange juice. The manufacturers were found guilty under Section 362 A of the Sudan Penal Code, for false description and were fined LS. 30.

Another sample of orange squash that showed heavy mould growth two days after opening was found to contain no preservatives.

An unofficial sample of an alleged orange squash was found to contain no genuine orange juice.

Wheat Flour

Most of the samples submitted were found to be heavily contaminated with live and dead weevils and larvae. The flour also showed rapid re-infestation after sieving. This is becoming quite a problem in view of the large amounts of flour involved. The Public Health Authorities are now taking steps to examine all imported consignments of flour before clearance.

Some samples suspected of adulteration with Dura flour were found to be genuine.

Dura Flour

Some condemned samples were found to be heavily contaminated with foreign matter and sand. These were made from uncleaned grains for use by prisoners who objected to its " Kisra." Cleaning the grain before grinding was recommended.

Biscuits

As usual samples from very old stocks were found to have become rancid or infested with weevils. In one condemned sample the acidity of the extracted fat was 22.7 per cent as oleic acid.

Honey

It seems that the word "honey" in Arabic is commonly taken to mean real bee's honey or cane treacle, and there is no easy way out of this labelling problem. It is usual, however, to describe honey and treacle in Arabic as "Bee" and "Cane" honey respectively, and this should be adhered to in labels.

The trouble with most of the samples submitted was heavy iron contamination during manufacture. One sample of treacle contained 750 p.p.m. of iron as Fe.

Two samples of treacle, one from old canes and the other from new canes were examined for the cause of the difference in taste and flavour. The results of the analyses were as follows :—

	Old Cane Treacle	New Cane Treacle
	per cent	per cent
Moisture	27.2	22.8
Sucrose	12.5	34.8
Invert Sugar	47.0	29.8
Ash	3.6	2.0
Iron as Fe. p.p.m.	250	60

It was thus concluded that considerable inversion had taken place in the older canes coupled with heavier iron contamination during manufacture which explains the change of taste and flavour.

Dried Milk

One sample of condemned dried skimmed milk powder was found to be infested with weevils.

It has been noticed that dried skimmed milk powder and skimmed milk processed cheese are packed in tins labelled only in English. The Arabic reading public was buying these articles without any knowledge of the difference between these skimmed milk products and similar whole milk products in the market.

This emphasises the importance of making Arabic labels obligatory on all articles of food and drinks sold in Northern Sudan. This will ensure that the majority of the retailers and public will know what they are buying.

Coffee

Two samples of ground coffee were found to be adulterated with about 40 per cent roasted wheat. The supplier was given a warning by the Superintendent of Standards.

Canned Fruits and Vegetables

The majority of these were condemned according to Public Health Regulations for being blown, or for leaking seams.

Semn and Substitutes

Only one sample of an alleged pure Semn was found to be hydrogenated fat. Other samples were sent by Customs for confirmation.

Alcoholic Drinks

Arsenic contaminated wines have disappeared this year. All samples presented were of good quality except for one sample of sherry that caused diarrhoea to some persons. The sherry was found to contain a lot of suspended matter that had probably come from the residues at the bottom of the barrel.

4. Drugs and Poisons

These consisted of :

(i) Unknown drugs for identification.

(ii) Samples from the Ministry of Health and others to see if they complied with pharmacopoeial specifications, and labelled contents.

(iii) Samples of drugs from the Customs Department for classification.

(i) *Unknown Drugs*

(a) Vials marked Seclopen. The contents were suspected as being stolen and replaced by a similar emulsion. The vials were found to contain only Bisoxyl.

(b) Unclaimed barrels from Sudan Railways containing a liquid insecticide. The insecticide was found to be D.D.T.

(c) Unclaimed property found in Khartoum and packed in small bags. The stuff was identified as Silica Gel.

(ii) *Samples from the Ministry of Health and others to see if they complied with pharmacopoeial specifications, and labelled contents.*

(a) Dextran Solution (for blood transfusion) was found to contain suspended matter of the Polysaccharide.

(b) Anaesthetic ether from a hospital found to contain high concentration of peroxides.

(c) Sulphacetamide eye-drops from a drug store found to contain much less than the Sulphacetamide content declared on the labels.

(d) A quantity of Boric Acid Ointment delivered by contractor to the Medical Stores was found to contain over 10 per cent of Boric Acid instead of the B.P.'53 specification of 1 per cent which is specified in the tender. The manufacturers admitted their mistake and the Ointment was rejected.

(e) Two salt solutions from hospitals which were supposed to be Potassium Citrate and Potassium Bromide. The first was found to be a mixture of Potassium Citrate and Sodium Bicarbonate. The other was found to be a solution of Potassium Iodide.

(iii) *Samples of drugs from the Customs Department for classification*

During the year the Government Analyst helped in amendment of the Poison List to include all the Dangerous Drugs controlled by International Convention, and all the toxic insecticides. Many brands of pharmaceutical preparations were analysed for Dangerous Drugs or Poisons, so that they could be classified accordingly.

Detergent powders were also analysed for absence of soap for Customs purposes.

A number of analyses were also done for private firms on damaged preparations, identifications, assays and the examination and destruction of old stocks of Dangerous Drugs on their Poison Books.

5. Clinical Specimens

These consisted of :—

2 Stools for fat analysis.

1 Bladder stone for identification.

2 Blood samples for uric acid estimation

2 Blood samples for alcohol estimation

1 Common salt sample for iodine estimation. Clinical specimens are rather rare because such work was mostly taken over by Stack Medical Research Laboratories.

6. Toxicological Specimens

The following are some of the cases examined :—

(i) 23 persons suffered severe diarrhoea after the consumption of milk. The milk was found to contain 1000 p.p.m. of Zinc as Zn. This came from the Zinc galvanised can used.

Another sample of milk that caused vomitting to some people also contained 700 p.p.m. of Zinc as Zn.

(ii) One case of attempted abortion by a substance which was identified as quinine sulphate.

(iii) A sample of bread and " Tamia " sandwich that had caused vomitting to a young girl. The food was found to be heavily contaminated with crystal violet that came from carbon paper wrappings in the canteen.

(iv) 8 tablets of an unknown drug were taken by a person 4 at a time in two hour intervals, and hence suffered severe poisioning symptoms. The tablets were identified as Vegetable Laxative Tablets B.P.C. the maximum dose of which is 3 tablets per day.

(v) A native purge alleged to have caused poisoning to a patient was found to contain an Impomoea resin mixed with fermented Dura flour.

(vi) Urine of a man who died suddenly after being drunk was found to contain 560 mg. of alcohol per 100 ml. of urine.

(vii) A patient who had attempted suicide by drinking a liquid suffered from severe abdominal pain and collapsed. The liquid was found to be a strong solution of Caustic Soda.

There was also another case of attempted suicide by drinking a liquid identified as Disinfecting fluid "Faneek".

(viii) A child suffered from severe poisoning symptoms after being given a native medicine of some roots. The roots were identified as those of Gloroisa virescens that contains colchicine.

(ix) 7 persons suffered from headache, giddiness and palpitation after drinking an infusion of tea and some seeds. The seeds were identified as those of Datura metel.

(x) 8 persons suffered from acute poisoning symptoms after drinking water. The water was found to be heavily impregnated with arsenic.

(xi) Sample of a corm of a plant called Bereid or Bassal El Kelab (Scillia lilacina) which is used as a fish poison in the South and used as a criminal poison, was found to contain an unknown glycoside. The acid extract of the plant was found to be lethal if injected into a rabbit. Work on this acid extract is being continued in conjunction with Stack Medical Research Laboratories.

(xii) A plant which was found to cause paralysis to the hind legs of goats was identified by the Ministry of Agriculture as Impomea Kaffia. The plant was found to contain a resin. Work on other active ingredients is being continued.

(xiii) 57 goats died after what was suspected to be a rat posion. That was verified by the presence of Zinc phosphide in the poisonous meal.

(xvi) Samples of Opium and Hashish have increased considerably. Three samples of Opium and seven of Hashish were received during the year compared with one sample of Opium and five of Hashish received last year.

7. Forensic Specimens

(i) A liquid taken from a laundry shop after a fire was found to be a soap benzol mixture.

Another liquid from a shop after a fire was found to be a varnish like mixture containing a resin and a mixed solvent containing amyl acetate, methyl alcohol and methyl ethyl ketone.

(ii) A forged signature on a permit to enter the Sudan was proved to be a traced signature.

(iii) Part of a crashed Airliner examined for possible cause of fire.

(iv) Suspected Opium identified as crude Indian Podophyllum resin.

(v) Remains of a home made bomb that exploded and killed its maker. The contents of the bomb were identified as a mixture of Sulphur, Potassium Chlorate, Carbon and lead shot.

(vi) Hair cream suspected as adulterated was found to be diluted with vaseline.

(vii) A case of suspected erasure was examined and no erasure was detected.

(viii) Engine oil from an airliner in which some brake oil was added by mistake. No other foreign matter beside the brake oil was found in the engine oil.

(ix) A knife used to force open a window in a house-breaking case. No conclusive evidence of criminal use was found.

Forensic samples of a toxicological nature have already been included in the toxicological Section above.

8. Edible Oils, Seeds and Oilcakes

The following were submitted for analysis by commercial Companies :—

	1957/58	1956/57
Cottonseed	280	139
Groundnuts	89	41
Sesame Seeds	25	18
Safflower Seeds	0	5
Castor Seeds	28	39
Edible Oils	40	35
Oil Cakes	119	186
TOTAL	581	463

Most of these samples came from Commercial firms for issue of Official Certificate of Analysis for export purposes. There is a marked increase in these types of samples.

9. Damaged Materials

341 samples were submitted compared with 106 samples last year. These samples are usually submitted in connection with insurance claims so as to determine the cause of damage. In some cases requests for estimation of extent of loss in value through damage was asked for. This was of course declined as such estimates need a Commercial expert rather than an Analytical Chemist.

There is also a marked increase in the number of these samples.

10. Miscellaneous Samples

The following table shows the various types of miscellaneous samples analysed.

DESCRIPTION	Number of Samples
Alcohols	4
Building Materials—Cement etc.	3
Chemicals	2
Coal	27
Dyes—Hair	2
Essence	1
Gums	17
Hair	2
Hair Cream	1
Insecticides	16
Metals, Alloys, Ores etc.	18
Mineral Oils	7
Soaps	23
Textiles, Textile Materials and Plastics ...	102
TOTAL	225

Analysis for most of these is done for quality control—hair dyes were analysed with regard to cases of serious inflammation caused by their application. These were found to be paraphenylenediamine dyes—imported hair from the customs was identified in the two occasions as human hair.

RESEARCH REPORT

As pointed out in the Administrative Report at the beginning of this Report the staff position and the increase of routine work, coupled with the time consumed in revising the analytical methods, fitting new apparatus and reorganising the laboratories, the stores and the library, left no time for any type of serious research.

Nevertheless many small problems were investigated in the course of our heavy routine, and advice and help was extended to many Government Departments and other Establishments in their various scientific problems.

The Research discussed below is being pursued in intermittent periods when the routine work subsides from time to time.

(1) Composition of the Niles at Khartoum

The regular analysis of water samples taken from the Blue and White Niles at Khartoum and the Khartoum Mains Supply was continued. Since this series was started two years ago many bodies have made use of it. Copies of analytical data were supplied on request to many people intending to start industries in Khartoum Area.

(2) Election Commission Marking Reagents

The Election Commission approached the Government Analyst on the problem of developing a marking solution for Election purposes. The solution should have the following properties :—

(a) Give a distinct fast mark that should be durable for at least five days, and which disappears in time.

(b) It should be easy and quick to apply.

(c) It should not have any harmful or irritating effects.

(d) It should be safe to transport and store without undue hazards.

(e) It should be reasonably cheap.

After several trials, silver nitrate stains were found to be reasonably effective if an immediate developer could be applied. For economy and manipulation purposes silver nitrate pencils made of Toughened Silver Nitrate B.P.'48 were found suitable. The developer was made of 7 per cent solution of Pyrogallol in 80 per cent alcohol containing 0.1 per cent caustic soda.

The procedure of marking proved a bit complicated and time consuming. The skin had to be wetted slightly and the mark made by the pencil and left to dry for one minute before applying the developer.

The Election Commission decided to try this marking procedure as an additional safeguard against revoting. So the Government Analyst ordered the necessary pencils and chemicals and over 10,000 bottles of developer were prepared, packed and dispatched with pencils to voting centres.

Unfortunately this marking experiment was not a big success and had to be abandoned in big towns for the following reasons :—

(a) The time consumed proved to be too long and was holding up the voting proceedings.

(b) People making the marks were not familiar with the exact procedure or were modifying it to save time.

(c) Most of the pencils were freshly manufactured and proved much softer than the original samples tried. Instead of over 1000 marks per pencil the new pencils were making an average of 100 marks.

(d) The marking process was realised to be unnecessary after careful revision of Registration lists.

Had it been realised that this marking process was unknown, the difficulty in developing such a process at such short notice could be appreciated. Now Trinidad intends to experiment with our method for their Elections, although we did not recommend it from experience.

All the same we intend to develop a new single solution in time for the next Elections, and solution for para-phehylenediamine in acetone or some other sutiable solvent may prove better.

(3) Nitrates in Potable Waters

Work on this problem was started last year and data are being accumulated to elucidate the way between the various conflicting views on nitrates toxicity in water. In last year's Annual Report the problem was discussed in the section dealing with waters. Now the work is being continued, with the help of Health and Veterinary Authorities.

(4) Glycosides of Scilia Lilacina (Bereid)

This plant which was mentioned earlier in the Toxicology Section is a small plant belonging to Liliaceae family. Its corm if given orally to a rabbit produces peculiar symptoms that indicate that it is a brain poison. Like many other members of the Liliaceae the plant is thought to contain a glycoside like substance. Its active extract is being further investigated for Stack Medical Research Laboratories.

REPORTS AND PUBLICATIONS

This year there was a substantial increase in the number of problems on which the Laboratories had been consulted and its assistance sought. That is because many authorities and private concerns became increasingly conscious of the services and advice these Laboratories can offer in various scientific problems.

The following list shows some of these problems in which the Laboratories were consulted.

1. Revision of the Sudan Poisons Lists to include all Dangerous Drugs controlled by International Convention, Anti-histamine Drugs and Toxic Economic Poisons *i.e.* insecticides, pesticides etc.

2. Control of Nimitti-catching experiments in different parts of Khartoum were made.

3. Bilharzia control in the Gezira. Copper estimations were made on the spot by a Senior Technical Assistant.

4. Enquiries from Foreign Legations through the Ministry of External Affairs about Laws, Regulations and Standards for Control of Food and Drugs in the country, or for data on some Sudanese Products.

5. Enquiries from firms and others about water standards and quality in different parts of the country.

6. The New Laboratory in the School of Hygiene needed apparatus and chemicals for the chemical and Bacteriological Analysis of milk, water and sewage. The Government Analyst was asked to prepare a list of the equipment, apparatus, instruments and chemicals required.

Moreover the Laboratories were approached to supply standard solutions, mixtures and various preparations. The following are some of the reagents supplied.

1. 10,000 (8 Oz.) bottles of Developer Solution and 10,000 Silver Nitrate Pencils for the Election Commission (see Research Report No. 2).

2. Mixture of dried and finely ground sodium chloride and calcium chloride for Artificial Rain experiments by the Meteorological Service.

3. Various solutions, standardised solutions, prepared indicators and chemicals for Stack Medical Research Laboratories, School of Pharmacy, the University of Khartoum, the Ministry of Education, the Geological Survey and Sudan Railways, and some Industrial Firms.

Publications

The Annual Report of the Government Analyst for the year 1956/57 was published.

CHAPTER IX

SCHOOL OF HYGIENE

School Facilities

The School occupies its own buildings which has a great advantage of being next door to the Graphic Museum. The Graphic Museum which is also directly supervised by the Principal of the School of Hygiene, and which is extensively used by the students provides very useful material for demonstrations and other visual studies.

Staff

1. Principal.
2. Asst. Principal.
3. Public Health Officer
4. Clerk

Board of Studies

The Board of Studies in association with the School which consists of the A Director (Public Health) as chairman, Principal, School of Hygiene as secretary, Chief Public Health Inspector and A/Principal as members have held four meetings during the year to discuss the different aspects of the School's Policy.

Basis of Education for the School

The basis of education in which training is superimposed is that of the 4th year secondary standard.

Asst. Sanitary Overseers

These are Local Government officials and their training is made from curriculum prepared by the Prinicpal School of Hygiene. Their training outside is undertaken by the Local Senior Public Health Inspectors and those in Khartoum Province receive an organised course of training in the School of Hygiene.

Sanitary Overseers

These are Ministry of Health officials and candidates are drawn from the A Sanitary Overseers category by examination.

On selection the candidates receive a six months training in the School of Hygiene, which includes an adequate number of demonstrations to supplement lectures.

Public Health Officer Students

The basic education now required is that of the secondary standard. Candidates for the school are required to be from those who have completed their secondary education. The selection is made by an interview.

The students take a 3 years course at the end of which they must pass the R.S.H. examination before being awarded the qualifying certificate.

The curriculum is briefly as follows :—

1st Year :

General Science, Building Science, Drawing and Construction, Levelling and Geometry. Given at Khartoum Technical Institute.

2nd Year :

Entomology and Pest Control, Helminthology, Protozoology, Bacteriology, Water Supply and Disposal of Waste Matter.

3rd Year :

Food and food control, meat inspection, milk food production and manufacture, housing, urban and rural planning, communicable diseases, school health, prison health, quarantines at airports and seaports, central statistics, sanitary law, relations between councils and public health staff, notes on training within industries.

The necessary demonstrations that supplement the lectures include visits to water works, food production places, schools, prison manufactures and factories of public health interest, and certain council meetings.

SCHOOL REPORT FOR THE PERIOD

1st July, 1957—30th July, 1958

During the year 38 students were under training in the following classes.

1st year 15 and 3 from Aden Municipality.

2nd year 10

3rd year 10

The 3rd year students took the R.S.H. examination on 24th, 25th, 26th and 28th April, 1958.

The examination which was held in Khartoum, was conducted by Dr. Abdalla Omer Abu Shama, Dr. Mansour Ali Hasseib, Sayed Abdel Rahman El Agib and Sayed Khalafalla Babiker, with the Principal of the School in attendance.

Of the 10 entrants 7 passed the examination, they were :—

1. El Sunni Amin El Sunni
2. Fadl Alla Hashim Hamza
3. El Nur Abdalla El Nur
4. Hussein Sharif Ahmed
5. El Hadi Abdel Razag
6. Abdel Aziz Osman
7. Abdel Bagi Abdel Rahman

The 3 unsuccessful entrants have been deferred for a period of 3 months to be re-examined on 1st August, 1958.

Second Year

The terminal examination for the 2nd year was held on 17th, 18th, 19th and 20th March, 1958.

The students took the examination with the result of one failure.

All students who attained a pass mark below 60 per cent have been warned in writing in order to work hard in the final term.

First Year

The 1st year students entered the Building Department of the Khartoum Technical Institute and continued their training for one year.

The 1st year course covers : -

(a) Technical Drawing.

(b) General Science.

(c) Mathematics.

(d) Building Construction

(e) Surveying.

(f) Painting.

(g) Building Material.

(h) Sanitation.

Practical Training

The daily practical training is being carried out in Khartoum City and its rural areas. 2nd and 3rd year students have specific districts for their daily practical training hour and on Thursdays they do full time inspection and report on sanitary premises and food preparation centres. Water and milk samples from Khartoum Province are handled by the students.

As a part of the practical training the students used to visit the Gezira to obtain practical information on the Bilharzia and Malaria control and to attend certain rural council meetings and to have information on their Health Schemes and their actual relations with the Public Health Inspectorate staff.

In the practical work scheme the students used to visit Kosti Meat Factory and when possible they visit Port Sudan and Suakin to have information on Port Sanitation and Disinfection work.

Annually during the school vacation between April and August the students after being granted their leaves, were posted to different provinces to work under qualified Public Health staff.

Unfortunately financial difficulties have arisen which will curtail the practical scheme so as to exclude all outside visits.

However the possibility of confining the practical work to Khartoum Province only is now being considered.

The danger of this application has been elucidated by the Principal School of Hygiene and the Board of Studies in correspondences and minutes of the Board to draw the attention of the Director for further steps.

Sanitary Overseers

12 have received a course of training in the School from 15.4.1958. to 2.6.1958 and an examination at the end of the course was set with a satisfactory result.

Health Visitors

5 pupils have attended the Public Health course during the year. An examination was set with the result that all passed.

Buildings

School

Ministry of Works has built a garage for the car and a store in the School.

Hostel

At the meeting held on 10th August 1957, at the Municipal Council Chamber, it was agreed that the Hostel of the School of Hygiene was to expand on the existing Sanitary Hamla (Block 5.L.W.). Now Ministry of Works has built one room, one bath room and one latrine in the Hostel.

CHAPTER X

THE GRAPHIC MUSEUM

There was no change of staff during the year.

Revision of sections, the up-keep of exhibits, up-to-date and routine work require much of the museum staff's time. In addition extensive programmes of work on outside and agricultural shows were carried out, at the same time maintaining the good standard of the museum.

As in the past the teaching facilities which the museum affords were taken advantage of by the senior class of Medical Students, Students of the School of Hygiene, Medical Students Assistants, Health Visitors, Midwives and Junior Hospital Staff. More use was made of the museum by the pupils of the Secondary Schools and Elementary Schools both boys and girls.

Recorded visits to the museum by the General Public during the year were 14,956.

The Arabic Translation of the matter in the museum was carried out satisfactorily. Translation of Malaria, Sleeping Sickness, Flaria, Yaws, and Bilharzia sections was completed. The translation of these sections is most useful to the General Public.

Permanent Exhibitions

The following material was added during the year :—

Photographs	120
Charts	14
Drawings	60
Descriptive Notes	500
Models	10
Specimens	15
Posters	2

The exhibitions now comprise :—

Photographs	2,281
Charts and Graphs	248
Drawings	275
Models	210
Specimens	281
Descriptive Notes	2,158
Posters	17

Audio Visual Aids Centre

The assistant Curator, while in England on study course (Health Education), had been given financial approval, and he was authorised to order the equipment necessary for establishing Visual Aids Centre for Health Education. Now the Centre is furnished with a cine-camera, projectors and a tape recorder, beside the other material necessary for the work. Films on Public Health and Science were displayed to the Students of the Senior Class of Medical Students, Students School of Hygiene and Medical Assistant Students.

A leaflet on flies was published during the year. Another on Bilharzia, Nutrition, and Child and Maternity are ready for press. Also a Poster on B.C.G. was produced.

The assistant curator was among the delegation that represented the Republic of the Sudan at the Conference in April, 1957 on Health Education, held in London.

It is a pleasure to report that the following distinguished persons have visited the museum this year :—

1. Prof. Saad Mahir Hamza .. Cairo University.
2. Curdial S. Dillon .. .. UNICEF, Representative for Sudan, Egypt, and Libya.
3. Fastin B. Sandbury .. UNICEF, EMAO, Beruit.
4. E. T. Spooner .. .. London School of Hygiene and Tropical Medicine.
5. Dr. G. H. Jullad .. .. M. A. H. Consultant, EMRO, WHO, ALEXANDRIA.

Sections of the museum are :—

1. Malaria
2. Trypanosomiasis
3. Leishmaniasis
4. Syphilis
5. Yaws
6. Relapsing Fever
7. Filariasis
8. Diphtheria
9. Ancylostomiasis
10. Schistosomiasis
11. Madura Disease
12. Nutrition
13. Tuberculosis
14. Gonorrhoea
15. Cholera
16. Tetanus
17. Anthrax
18. Cerebro-Spinal-Meningitis
19. Plague
20. Rabies
21. Leprosy
22. Measles
23. Mumps
24. Yellow Fever
25. Smallpox
26. Chickenpox
27. Vaccinia
28. Dengue.
29. Typhus
30. Quarantine arrangements
31. Phlebotomus Fever
32. Disinfection Methods
33. Meteorology
34. Water Supply
35. Influenza
36. Pneumonia
37. Dysentery
38. Enteric Fever
39. Maternity and Child Welfare
40. School Medical Service
41. Town Planning
42. Housing
43. Undulant Fever
44. Black Water Fever
45. Eye Diseases
46. Medical Entomology
47. Skin Diseases
48. Disposal of Waste Matter
49. Folk Medicine
50. Propaganda
51. Rural Health
52. Hydatid Disease
53. Venemous Snakes
54. Historical Medicine
55. Tumours

CHAPTER XI

METEOROLOGY

The following table shows the mean rainfall recorded in provincial meteorological stations :—

Province	No. of Stations	Mean Rainfall mms.	Highest Recorded mms.	Lowest Recorded mms.
Bahr El Ghazal	7	877	1,349	490
Blue Nile	17	426	820	192
Darfur	9	513	683	218
Equatoria	14	1,238	1,725	686
Kassala	14	293	777	41
Khartoum	6	235	308	189
Kordofan	10	528	785	304
Northern	9	54	193	3
Upper Nile	8	793	1,006	549

TABLE I.

OUT-PATIENTS

NEW CASES BY DISEASES AND TOTAL ATTENDANCES

DISEASE	B. EL GHAZAL	BLUE NILE	DARFUR	EQUATORIA	KASSALA	KHARTOUM	KORDOFAN	NORTHERN	UPPER NILE	TOTAL	
1. Cholera	—	—	—	—	—	—	—	—	—	—	1
2. Plague	—	—	—	—	—	—	—	—	—	—	2
3. Small-Pox ...	1	199	—	—	71	—	2	17	5	295	3
4. Typhus	—	—	—	—	—	—	—	—	—	—	4
5. Yellow Fever ...	—	—	—	—	—	—	—	—	—	—	5
6 T.B. Pulmonary	573	1,156	154	258	1,078	2,646	393	625	612	7,495	6
7. T.B. Non-Pulmonary ...	106	511	90	47	1,122	1,250	220	174	1,059	4,579	7
8. Pneumonia ...	921	25,025	17,156	3,687	4,420	14,827	10,101	9,865	5,783	91,785	8
9. Influenza ...	13,741	68,767	11,738	26,930	62,707	89,480	51,203	46,336	18,444	389,346	9
10. Other Respiratary Diseases ...	18,651	530,803	135,628	101,359	154,429	204,822	204,121	189,956	56,586	1,596,355	10
11. Cerebro-pinal Meningitis ...	1,236	121	15	153	19	22	77	7	358	2,008	11
12. Chicken-Pox ...	788	2,245	359	1,577	1,203	1,279	1,347	1,956	769	11,523	12
13. Diphtheria ...	1	115	12	4	74	217	31	41	11	506	13
14. Encephalitis Lethargica ...	—	—	—	—	—	—	—	—	—	—	14
15. Measles	104	4,720	664	75	870	4,665	2,727	4,688	161	18,674	15
16. Mumps	59	5,753	98	158	1,724	4,439	4,089	2,874	633	19,827	16
17. Poliomyelitis, Acute	—	13	—	—	—	37	1	—	—	51	17
18. Rheumatism, Acute	1,598	5,285	785	4,464	232	1,665	1,419	1,926	373	17,747	18
19. Whooping Cough	53	4,219	12	51	2,822	2,515	1,554	5,336	574	17,136	19
20. Dysentery ...	7,241	23,460	12,429	3,533	7,645	20,741	13,253	24,073	13,187	124,902	20
21. Enteric Fever ...	3	141	2	7	29	41	2	86	50	361	21
22. Gastro-Enteritis of Children ...	135	48,856	4,777	271	2,417	24,229	6,819	13,453	4,624	104,981	22
23. Undulant Fever...	—	27	1	7	9	35	1	2	1	83	23
24. Filariasis	20	1	6	936	—	—	20	—	84	1,067	24
25. Leishmaniasis ...	—	2,432	—	94	630	19	10	—	724	3,909	25
26. Malaria	14,762	79,017	31,689	50,782	43,842	13,701	91,048	20,422	24,993	370,256	26
27. Blackwater Fever	—	—	—	—	—	—	—	—	—	—	27
28. Onchocerciasis ...	78	—	—	13	—	—	—	—	—	91	28
29. Phlebotomus Fever	—	—	—	—	—	—	—	—	—	—	29
30. Relapsing Fever	—	—	—	—	—	—	—	—	2	2	30
31. Trypanosomiasis	—	—	—	159	—	—	—	—	—	159	31
32. Anclystosomiasis	2,091	90	424	5,995	23	26	25	88	45	8,807	32
33. Dracontiasis ...	1,202	166	4	3,643	84	56	699	—	322	6,176	33
34. Schistosomiasis ...	447	12,862	5,308	3,960	159	3,061	12,096	3,673	79	41,645	34
35. Gonorrhoea ...	2,874	6,729	11,076	2,541	3,300	5,417	8,948	1,208	3,656	45,749	35
36. Soft Sore ...	7	504	997	70	443	637	446	33	730	3,867	36
37. Syphilis	8,368	17,561	40,146	7,825	12,680	8,991	28,118	4,429	13,866	141,984	37
38. Yaws	12,316	1	1	14,334	1	—	5	—	13,201	39,859	38
39. Anthrax	—	2	1	—	15	1	—	—	—	19	39
40. Hydrophobia ...	—	8	4	1	—	13	1	—	1	28	40
41. Leprosy ...	382	74	192	576	7	58	24	15	32	1,360	41
42. Madura	1	309	30	—	14	1,135	48	37	—	1,574	42
43. Tetanus ...	3	96	11	22	15	36	8	9	31	231	43
44. Heat Stroke Syndrome ...	—	—	—	2	6	4	2	2	—	16	44
45. Confinements ...	365	1,443	806	682	237	901	896	230	181	5,741	45
46. Gynaecological	237	13,392	6,278	35	5,796	18,604	9,357	3,229	259	57,187	46
47. Diseases of Pregnancy and Parturition ...	32	7,462	190	223	899	6,173	7,732	1,518	—	24,229	47
48. Puerperal Fever...	8	204	7	1	24	118	75	42	3	482	48
49. Wounds and Injuries ...	42,269	410,620	130,980	171,887	109,345	182,127	171,421	148,909	77,413	1,444,971	49
50. Tropical Ulcer ...	4,949	1,161	4,284	17,475	133	37	11,633	11	4,194	43,877	50
51. Diabetes ...	15	315	15	—	414	2,078	336	414	10	3,597	51
52. Pellagra	—	2	22	4	—	1	—	—	220	249	52
53. Scurvy	52	601	18	14	425	14	470	11	14	1,619	53
54. Neoplasms, Malignant ...	15	70	45	16	31	102	211	36	14	540	54
55. Neoplasms, Non-malignant ...	284	8,470	886	39	930	258	10	228	201	11,306	55
56. Trachoma ...	—	31,646	10,536	627	7,023	42,778	12,249	71,516	4,978	181,353	56
57. All other Eye Diseases ...	15,114	421,480	67,548	50,199	103,639	227,818	98,878	198,028	57,593	1,240,297	57
58. Ear Diseases ...	6,413	119,252	17,282	12,813	26,189	47,738	32,314	41,355	13,064	316,420	58
59. Skin Diseases ...	11,992	73,953	38,692	50,895	14,377	25,403	32,081	21,348	14,046	282,787	59
60. Alimentary Diseases ...	30,793	581,119	154,992	91,068	216,191	213,752	231,116	243,782	49,936	1,812,749	60
61. Circulatory Diseases	119	23,625	8,878	272	7,787	29,570	11,811	25,523	815	108,400	61
62. Genito-Urinary Diseases ...	588	80,295	21,361	2,373	13,888	32,174	19,591	35,782	2,563	208,615	62
63. Organic Nervous Diseases ...	11	5,737	1,986	2	250	3,149	2,859	5,016	610	19,620	63
64. Functional Nervous Diseases ...	71	384	—	1	—	482	2,516	2,829	12	6,295	64
65. Fever of Uncertain Origin ...	12,141	21,483	14,529	52,981	7,575	86,818	28,216	25,880	31,314	280,937	65
66. All other Conditions ...	35,984	366,788	87,149	158,835	76,902	141,547	95,936	113,207	53,345	1,129,693	66
67. Poisoning... ...	—	81	75	—	219	27	23	852	—	1,277	67
68. Hydated Cysts ...	—	—	—	51	—	—	—	—	—	51	68
69. Ascaris	—	—	—	170	—	—	—	—	—	170	69
Total New Cases	249,214	3,010,791	840,368	844,197	893,799	1,467,734	1,208,589	1,271,077	471,181	10,256,915	
ATTENDANCES: MEN...	394,746	1,802,651	555,399	602,886	581,391	1,225,918	835,274	787,827	301,800	7,087,892	
WOMEN ...	194,302	1,468,618	460,177	351,399	319,453	1,311,888	749,299	816,935	226,336	5,898,407	
CHILDREN ...	189,574	2,405,199	520,620	410,427	634,137	1,178,589	1,134,668	1,368,736	299,312	8,141,262	
Total Attendances ...	778,622	5,676,468	1,536,196	1,364,712	1,534,981	3,716,395	2,719,241	2,973,498	827,448	21,127,561	
MISSIONS	—	—	—	109,268	—	44,644	—	—	128,866	282,778	
Grand Total	778,622	5,676,468	1,536,196	1,473,980	1,534,981	3,761,039	2,719,241	2,973,498	956,314	21,410,339	

TABLE II

ADMISSIONS AND DEATHS BY DISEASES

DISEASE	BAHR EL GHAZAL		BLUE NILE		DARFUR		EQUATORIA		KASSALA		KHARTOUM		KORDOFAN		NORTHERN		UPPER NILE		TOTAL		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
1. Cholera	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
2. Plague	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
3. Small-Pox	1	1	46	6	—	—	—	—	60	16	—	—	2	—	17	—	5	—	131	23	3
4. Typhus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
5. Yellow Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
6. T.B. Pulmonary	253	19	844	57	137	9	240	11	543	40	922	48	340	40	300	8	170	11	3,749	243	6
7. T.B. Non-Pulmonary	29	—	235	20	48	4	48	13	154	8	153	2	127	3	102	2	165	16	1,061	68	7
8. Pneumonia	364	27	1,242	70	823	39	1,102	14	631	38	731	48	2,574	73	917	32	500	24	8,884	392	8
9. Influenza	199	2	867	4	307	1	913	4	622	2	805	14	1,109	23	674	8	4,745	12	10,241	70	9
10. Other Respiratory Diseases	449	9	1,804	57	864	24	591	4	1,293	14	1,205	5	1,645	25	1,062	22	680	23	9,593	183	10
11. Cerebro-spinal Meningitis	1,236	97	56	16	15	10	72	13	19	—	20	8	75	18	6	2	346	14	1,845	178	11
12. Chicken Pox	552	2	133	—	339	1	1,107	—	136	—	20	3	623	—	31	—	263	—	3,204	6	12
13. Diphtheria	1	1	115	15	12	2	4	—	74	5	106	3	31	2	41	9	7	1	391	38	13
14. Encephalitis Lethargica	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14
15. Measles	52	—	98	1	442	9	58	—	56	1	18	—	889	8	55	3	11	—	1,679	22	15
16. Mumps	16	—	147	—	77	—	13	—	80	2	52	1	469	—	54	—	39	—	947	3	16
17. Poliomyelitis, Acute	—	—	13	—	—	—	—	—	—	—	22	—	1	—	—	—	—	—	36	—	17
18. Rheumatism, Acute	115	—	162	3	39	—	42	—	92	—	69	—	161	—	174	—	76	—	930	3	18
19. Whooping Cough	—	—	141	2	—	—	11	—	56	1	46	—	47	—	31	—	167	1	499	4	19
20. Dysentery	520	27	388	7	2,529	12	295	9	277	—	249	3	407	4	467	9	687	28	3,819	99	20
21. Enteric Fever	3	1	141	19	2	—	7	—	13	1	33	6	2	—	86	2	59	3	337	32	21
22. Gastro-enteritis of Children	8	4	613	70	61	5	121	4	434	40	243	32	469	12	711	82	66	2	2,726	251	22
23. Undulant Fever	—	—	19	1	—	—	1	—	9	—	35	—	1	—	2	—	1	—	68	1	23
24. Filariasis	1	—	1	—	—	—	511	—	79	1	2	—	11	—	—	—	3	—	608	1	24
25. Leishmaniasis	—	—	1,054	89	—	—	94	3	627	48	16	1	10	1	—	—	172	20	1,973	162	25
26. Malaria	811	34	2,557	69	643	8	3,336	99	927	23	215	8	2,363	49	467	5	741	26	12,060	321	26
27. Blackwater Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	27
28. Onchocerciasis	19	—	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	23	—	28
29. Phlebotomus Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	29
30. Relapsing Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	30
31. Trypanosomiasis	—	—	—	—	—	—	159	—	—	—	—	—	—	—	—	—	—	—	159	—	31
32. Ancylostomiasis	289	7	14	—	101	4	1,083	9	13	1	1	—	6	—	17	—	22	1	1,546	22	32
33. Dracontiasis	62	—	30	—	2	—	221	—	8	—	39	1	29	—	—	—	49	—	440	1	33
34. Schistosomiasis	50	—	482	15	39	—	346	4	70	—	41	—	66	—	82	2	24	—	1,200	21	34
35. Gonorrhoea	172	—	21	—	176	—	758	—	69	—	120	8	226	—	12	—	119	—	1,673	8	35
36. Soft Sore	14	—	3	—	11	1	4	1	39	1	2	—	5	—	19	—	—	—	97	3	36
37. Syphilis	346	1	60	2	1,148	2	863	2	39	—	16	—	450	5	74	1	466	5	3,402	18	37
38. Yaws	203	—	1	—	—	—	501	1	—	—	18	1	—	—	—	—	462	4	1,185	6	38
39. Anthrax	—	—	2	—	1	—	—	—	15	1	—	—	—	—	—	—	—	—	18	1	39
40. Hydrophobia, Human	—	—	6	6	4	4	1	1	—	—	—	—	1	1	—	—	1	1	13	13	40
41. Leprosy	—	—	9	1	11	1	8	—	7	—	25	—	4	—	6	—	4	1	74	3	41
42. Madura Diseases	15	1	119	—	15	—	—	—	38	1	176	—	19	1	37	1	2	—	421	4	42
43. Tetanus	1	—	90	33	11	1	17	14	8	2	19	5	8	4	8	2	33	1	195	62	43
44. Heat Stroke Syndrome	3	—	1	—	—	—	3	—	6	1	4	—	2	—	1	—	—	—	20	1	44
45. Confinements	362	3	750	13	211	1	516	2	238	5	946	1	609	22	211	7	173	2	4,016	56	45
46. Gynaecological	134	1	1,237	14	459	—	31	1	1,385	2	1,142	3	983	6	805	8	68	1	6,244	36	46
47. Diseases of Pregnancy and Parturition	7	—	1,252	18	43	1	149	—	288	—	805	6	59	1	197	3	—	—	2,800	29	47
48. Puerperal Fever	6	2	101	5	7	1	1	—	23	1	118	1	39	6	30	1	3	—	328	17	48
49. Wounds and Injuries	1,853	44	4,050	76	3,409	48	4,124	48	3,321	51	2,873	38	3,450	74	2,090	45	1,938	13	27,108	437	49
50. Tropical Ulcer	416	6	8	—	228	1	751	3	18	—	1	—	450	1	1	—	509	1	2,382	12	50
51. Diabetes	8	—	116	5	11	1	—	—	50	4	181	25	27	2	168	6	3	—	564	43	51
52. Pellagra	—	—	2	—	—	—	1	—	—	—	—	—	—	—	—	—	141	—	144	—	52
53. Scurvy	52	2	22	—	—	—	4	—	—	—	2	1	43	4	5	—	2	—	130	7	53
54. Neoplasms, Malignant	7	1	76	9	29	3	13	1	57	6	73	19	43	1	27	2	4	1	329	43	54
55. Neoplasms, non-Malignant	52	—	82	1	75	2	38	1	92	2	135	4	135	—	36	—	5	—	650	10	55
56. Trachoma	—	—	14	—	163	—	26	2	5	—	—	—	28	—	22	—	45	—	303	2	56
57. All other Eye Diseases	129	—	486	—	224	1	397	3	120	—	1,265	1	526	—	627	—	405	1	4,179	6	57
58. Ear Diseases	59	—	34	1	138	—	101	—	14	—	48	—	82	1	251	2	39	—	766	4	58
59. Skin Diseases	132	1	176	5	174	1	500	2	83	4	143	—	426	13	155	2	123	—	1,912	28	59
60. Alimentary Diseases	543	30	2,953	197	1,270	67	1,408	90	1,645	93	3,160	93	2,124	151	1,640	36	993	49	15,736	806	60
61. Circulatory Diseases	104	16	847	68	196	17	26	—	518	42	422	78	390	71	758	58	74	14	3,335	364	61
62. Genito-Urinary Diseases	79	3	657	33	307	8	49	1	316	14	440	29	442	37	722	10	41	—	3,053	135	62
63. Organic Nervous Diseases	10	1	112	11	29	1	2	—	105	2	129	10	375	10	114	2	28	3	904	40	63
64. Functional Nervous Diseases	9	1	43	—	3	—	—	—	—	—	25	1	28	1	37	1	—	—	145	4	64
65. Fever of Uncertain Origin	267	12	513	31	243	7	286	7	414	11	416	10	229	26	700	17	409	24	3,477	145	65
66. All other Conditions	2,756	108	1,520	60	1,083	42	2,970	77	2,445	57	2,124	58	880	36	641	19	734	22	15,153	479	66
67. Poisoning	—	—	70	4	21	—	—	—	41	4	27	1	22	2	30	—	—	—	211	11	67
68. Hydated Cysts	—	—	—	—	—	—	51	—	—	—	—	—	—	—	—	—	—	—	51	—	68
69. Ascaris	—	—	—	—	—	—	23	—	—	—	—	—	—	—	—	—	—	—	23	—	69
Total	12,769	464	26,635	1,114	14,180	339	24,001	471	17,672	545	19,898	576	23,562	734	14,720	409	15,753	325	169,190	4,977	
MISSIONS	—	—	—	—	—	—	1,412	22	—	—	1,150	59	3,056	73	—	—	735	11	6,353	165	
Grand Total	12,769	464	26,635	1,114	14,180	339	25,413	493	17,672	545	21,048	635	2,6618	807	14,720	409	16,488	336	175,543	5,142	